Annual Radiological Environmental Operating Report

James A. FitzPatrick Nuclear Power Plant

2002

Entergy
Nuclear Northeast

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

JANUARY 1, 2002 - DECEMBER 31, 2002

FOR

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

ENTERGY NUCLEAR FITZPATRICK, LLC (ENF)

ENTERGY NUCLEAR OPERATIONS, INC (ENO)

FACILITY OPERATING LICENSE DPR-59

DOCKET NUMBER 50-333

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1.0 EXECUTIVE SUMMARY

The Annual Radiological Environmental Operating Report is published pursuant to Section 5.6.2 of the J.A. FitzPatrick N.P.P. Technical Specifications and 10CFR50.4. The Technical Specifications require that the results from the Annual Radiological Environmental Monitoring Program (REMP) be provided to the Nuclear Regulatory Commission.

This report describes the REMP program, the implementation, and the results obtained as required by Technical Specifications. The report also contains the analytical results tables, data evaluation, dose assessment, and data trends for each environmental sample media. Also included are results of the land use census, historical data and the Environmental Laboratory's performance in the Quality Assurance Intercomparison Program required by the Offsite Dose Calculation Manual (TS/ODCM).

The REMP is a comprehensive surveillance program, which is implemented to assess the impact of site operations on the environment and compliance with 10CFR20, 40CFR190 and 10CFR72. Samples are collected from the aquatic and terrestrial pathways applicable to the site. The aquatic pathways include Lake Ontario fish, surface waters and lakeshore sediment. The terrestrial pathways include airborne particulate and radioiodine, milk, food products and direct radiation.

During 2002, samples collected as part of the required monitoring program demonstrated that there is no significant radiological impact from the operation of the FitzPatrick plant. Cesium-137 was detected in several aquatic pathways at low levels and is directly attributed to fallout from past weapons testing. Tritium was detected in two surface water samples near the detection limit and are not considered to be plant related. The 2002 results for all the pathways sampled are consistent with the previous five year historical results and exhibit no adverse trends.

In summary, the analytical results from the 2002 Environmental Monitoring Program demonstrate that the routine operation of the facilities at the Nine Mile Point site had no significant or measurable radiological impact on the environment. No elevated radiation levels were detected in the off-site environment as a result of the hydrogen injection program, the storage of radioactive waste, or the implementation of the Independent Spent Fuel Storage Installation. The results of the REMP program continue to demonstrate that the operation of the plant did not result in a significant measurable dose to a member of the general population, or adversely impact the environment as a result of radiological effluents. The environmental program continues to demonstrate that the dose to a member of the public as a result of the operation of the James A. FitzPatrick Nuclear Power Plant remains significantly below the federally required dose limits specified in 10CFR20, 40CFR190 and 10CFR72.104(a).

2.0 INTRODUCTION

The James A. FitzPatrick N.P.P. is owned and operated by Entergy Nuclear FitzPatrick, LLC (ENF), Entergy Nuclear Operations, Inc. (ENO). This report is submitted in accordance with Technical Specifications Section 5.6.2 to License DPR-59, Docket No. 50-333. This report covers the calendar year 2002.

An amendment to the J.A. FitzPatrick N.P.P. Technical Specifications implemented on August 08, 2002 resulted in the relocation of the Radiological Environmental Monitoring Program (REMP) requirements from the facility Technical Specifications to the Offsite Dose Calculation Manual (ODCM). Throughout this report references will be made to TS/ODCM. This refers to the Technical Specifications in effect from January 01, 2002 through August 06, 2002 and the subsequent Technical Specification amendment, implemented August 07, 2002 (06:00 hours), which resulted in the relocation of the requirements for the REMP into the ODCM.

2.1 PROGRAM HISTORY

Environmental monitoring of the Nine Mile Point site has been on-going since 1964. The program includes five years of preoperational data, which was conducted prior to any reactor operations. In 1968, the Niagara Mohawk Power Company began the required preoperational environmental site testing program. This pre-operational data serves as a reference point to compare later data obtained during reactor operation. In 1969, the Nine Mile Point Unit 1 reactor, a 615 Megawatt Boiling Water Reactor (BWR) began full power operation. In 1975, the James A. FitzPatrick Nuclear Power Plant, owned and operated at that time by the New York Power Authority, began full power operation. The FitzPatrick Plant, an 883 Megawatt (Rated) BWR, occupies the east sector of the Nine Mile Point site, approximately 0.57 miles east of Nine Mile Point Unit 1. In 1988, The Nine Mile Point Unit 2 reactor, also owned and operated by Niagara Mohawk, began full power operation. This 1207 Megawatt BWR is located between Unit 1 and FitzPatrick.

In 1985, the individual plant Effluent Technical Specifications were standardized to the generic Radiological Effluent Technical Specifications, much of which was common to the two reactors, and subsequently Nine Mile Point Unit 2. Subsequent Technical Specification amendments relocated the REMP requirements to the ODCM for all three plants. Data generated by the Radiological Environmental Program is shared, but each utility reviews and publishes their own annual report. On November 21, 2001 the ownership and operation of the James A. FitzPatrick N.P.P. was transferred from the New York Power Authority to Entergy Nuclear FitzPatrick, LLC and Entergy Nuclear Operations Inc. The facility operating license No. DPR-59 and Docket No.

50-333 remained the same. On November 07, 2001, the ownership of the Nine Mile Point Unit I and II facilities was transferred to Constellation Nuclear. These facilities are operated by Nine Mile Point Nuclear Station, LLC.

In summary, three Boiling Water Reactors, which together generate 2705 Megawatts, have operated collectively at the Nine Mile site since 1988. A large database of environmental results from the exposure pathways have been collected and analyzed to evaluate the potential impact from reactor operations.

2.2 SITE DESCRIPTION

The Nine Mile Point Site is located on the southeast shore of Lake Ontario in the town of Scriba, approximately 7 miles northeast of the City of Oswego. The nearest metropolitan area is located approximately 23.8 miles southeast of the site. The J.A. FitzPatrick generating facility and support buildings occupy a small shoreline portion of the 700 acre Entergy site, which is partially wooded. The land, soil of glacier deposits, rises gently from the lake in all directions. Oswego County is a rural environment, with about 34% of the land devoted to agriculture.

2.3 PROGRAM OBJECTIVES

The objectives of the Radiological Environmental Monitoring Program are to:

1. Measure and evaluate the effects of plant operation on the environs and to verify the effectiveness of the controls on radioactive material sources.

2. Monitor natural radiation levels in the environs of the JAFNPP site.

3. Demonstrate compliance with the requirements of applicable federal regulatory agencies, including Technical Specifications and the Offsite Dose Calculation Manual.

3.0 PROGRAM DESCRIPTION

To achieve the objectives listed in Section 2.3, an extensive sampling and analysis program is conducted every year. The James A FitzPatrick NPP Radiological Environmental Monitoring Program (REMP) consists of sampling and analysis of various media that include:

- Shoreline Sediment
- Fish
- Surface Waters
- Air
- Milk
- Food Products

In addition, direct radiation measurements are performed using thermoluminescent dosimeters (TLDs). These sampling programs are outlined in Table 3.0-1. The REMP sampling locations are selected and verified by an annual land use census. The accuracy and precision of the program is assured by participation in an Interlaboratory Comparison Quality Assurance Program (ICP). In addition to the participation in the ICP Program, sample splits are provided to the New York State Department of Health for cross checking purposes.

Sample collections for the radiological program are accomplished by a dedicated site environmental staff from both the Nine Mile Point Units (NMP) and James A. FitzPatrick Nuclear Power Plant (JAFNPP). The site staff is assisted by a contracted environmental engineering company, EA Engineering, Science and Technology, Inc. (EA).

TABLE 3.0-1

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

REQUIRED SAMPLE COLLECTION AND ANALYSIS

Exposure Pathway and/or Sample	Number of Samples [(a)] and Locations	Sampling and Collection Frequency [(a)]	Type and Frequency of Analysis
<u>AIRBORNE</u>			
Radioiodine And Particulates	**Samples from 5 locations:** **a. 3 Samples from off site locations in different sectors of the highest calculated site average D/Q (based on all licensed site reactors.).** **b. 1 sample from the vicinity of a community having the highest calculated site average D/Q (based on all licensed site reactors).** **c. 1 sample from a control location 9 to 20 miles distant and in the least prevalent wind direction[(d)].**	**Continuous sample operation with sample collection weekly or as required by dust loading whichever is more frequent.**	**Radioiodine Canisters: Analyze weekly for I-131.** **Particulate Samples: Gross beta radioactivity following filter change (b) composite (by location for gamma isotopic quarterly (as a minimum).**
Direct Radiation[(e)]	**32 stations with two or more dosimeters placed as follows:** **a. An inner ring of stations in the general area of the site boundary.** **b. An outer ring in the 4 to 5 mile range from the site with a station in each of the land based sectors. There are 16 land based sectors in the inner ring, and 8 land based sectors in the outer ring.** **c. The balance of the stations (8) are placed in special interest areas such as population centers, nearby residences, schools, and in 2 or 3 areas to serve as control stations.**	**Quarterly**	**Gamma dose monthly or quarterly**

TABLE 3.0-1 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

REQUIRED SAMPLE COLLECTION AND ANALYSIS

Exposure Pathway and/or Sample	Number of Samples [(a)] and Locations	Sampling and Collection Frequency [(a)]	Type and Frequency of Analysis
WATERBORNE			
Surface[(f)]	a. 1 sample upstream.[(d)] b. 1 sample from the site's most downstream cooling water intake.	Composite sample over a one month period[(g)].	Gamma isotopic analysis monthly. Composite for Tritium analysis quarterly[(c)].
Sediment from Shoreline	1 sample from a downstream area with existing or potential recreational value.	Twice per year	Gamma isotopic analysis semiannually[(c)].
INGESTION			
Milk	a. Samples from milk animals in 3 locations within 3.5 miles distant having the highest calculated site average D/Q. If there are none, then 1 sample from milk animals in each of 3 areas 3.5 to 5.0 miles distant having the highest calculated site average D/Q (based on all licensed site reactors)[(h)]. b. 1 sample from milk animals at a control location (9 to 20 miles distant and in a less prevalent wind direction)[(d)].	Twice per month, April through December (samples will be collected in January through March if I-131 is detected in November and December of the preceding year).	Gamma isotopic and I-131 analysis twice per month when milch animals are on pasture (April through December); monthly (January through March), if required[(c)].

TABLE 3.0-1 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

REQUIRED SAMPLE COLLECTION AND ANALYSIS

Exposure Pathway and/or Sample	Number of Samples [a] and Locations	Sampling and Collection Frequency [a]	Type and Frequency of Analysis
FISH			
	a. 1 sample of each of 2 commercially or recreationally important species in the vicinity of a site discharge point.	Twice per year.	Gamma isotopic[c] analysis of edible portions.
	b. 1 sample of each of 2 species (same as in a. above or of a species with similar feeding habits) from an area at least 5 miles distant from the site[d].		
FOOD PRODUCTS	a. In lieu of the garden census as specified in Part 1, Section 5.2, samples of at least 3 different kinds of broad leaf vegetation (such as vegetable) grown nearest each of two different off-site locations of highest predicted site average D/Q (based on all licensed site Reactors). One (1) sample of each of the similar broad leaf vegetation grown at least 9.3 miles distant in a least prevalent wind direction sector[d].	Once during harvest season.	Gamma isotopic(c) analysis of edible portions. (Isotopic to include I-131).

NOTES FOR TABLE 3.0-1

(a) It is recognized that, at times, it may not be possible or practical to obtain samples of the media of choice at the most desired location or time. In these instances suitable alternative media and locations may be chosen for the particular pathway in question. Actual locations (distance and directions) from the site shall be provided in the Annual Radiological Environmental Operating Report. Calculated site averaged D/Q values and meteorological parameters are based on historical data (specified in the ODCM) for all licensed site reactors.

(b) Particulate sample filters should be analyzed for gross beta 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air is greater than 10 times a historical yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

(c) Gamma isotopic analysis means the identification and quantification of gamma emitting radionuclides that may be attributable to the effluents from the plant.

(d) The purpose of these samples is to obtain background information. If it is not practical to establish control locations in accordance with the distance and wind direction criteria, other sites, which provide valid background data, may be substituted.

(e) One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purpose of this table, a thermoluminescent dosimeter may be considered to be one phosphor and two or more phosphors in a pocket may be considered as two or more dosimeters. Film badges shall not be used for measuring direct radiation.

(f) The "upstream sample" shall be taken at a distance beyond significant influence of the discharge. The "downstream sample" shall be taken in an area beyond, but near, the mixing zone, if practical.

NOTES FOR TABLE 3.0-1 (Continued)

(g) Composite samples should be collected with equipment (or equivalent) which is capable of collecting an aliquot at time intervals which are very short (e.g., hourly) relative to the compositing period (e.g., monthly) in order to assure that a representative sample is obtained.

(h) A milk sampling location, as required in Table 3.0-1, is defined as a location having at least 10 milking cows present at a designated milk sample location. It has been found from past experience, and as a result of conferring with local farmers, that a minimum of 10 milking cows is necessary to guarantee an adequate supply of milk twice per month for analytical purposes. Locations with less than 10 milking cows are usually utilized for breeding purposes, which eliminates a stable supply of milk for samples as a result of suckling calves and periods when the adult animals are dry. In the event that 3 milk sample locations cannot meet the requirement for 10 milking cows, then a sample location having less than 10 milking cows can be used if an adequate supply of milk can reasonably and reliably be obtained based on communications with the farmer.

3.1 SAMPLE COLLECTION METHODOLOGY

3.1.1 SHORELINE SEDIMENTS

One kilogram of shoreline sediment is collected at one area of existing or potential recreational value. One sample is also collected from a location beyond the influence of the site. Samples are collected as surface scrapings to a depth of approximately 1 inch. The samples are placed in plastic bags, sealed and shipped to the lab for analysis. Sediment samples are analyzed for gamma emitting radionuclides.

Shoreline sediment sample locations are shown in Section 3.3, Figure 3.3-5.

3.1.2 FISH

Samples of available fish species that are commercially or recreationally important to Lake Ontario, such as Lake Trout, Salmon, Walleye and Smallmouth Bass, are collected twice per year, once in the spring and again in the fall. Indicator samples are collected from a combination of the four on-site sample transects located off shore from the site. One set of control samples are collected at an off-site sample transect located off shore 8 – 10 miles west of the site. Available species are selected using the following guidelines:

a. A minimum of two species that are commercially or recreationally important are to be collected from each sample location. Samples selected are limited to edible and/or sport species when available.
b. Samples are composed of 0.5 to 1 kilogram of the edible portion only.

Selected fish samples are frozen immediately after collection and segregated by species and location. Samples are shipped frozen in insulated containers for analysis. Edible portions of each sample are analyzed for gamma emitting radionuclides. Fish collection locations are shown in Section 3.3, Figure 3.3-5.

3.1.3 SURFACE WATER

Surface water samples are taken from the respective inlet canals of the James A. Fitzpatrick Nuclear Power Plant (JAFNPP) and the NRG's Oswego Steam Station. The JAFNPP facility draws water from Lake Ontario on a continuous basis. This is used for the "downstream" or indicator sampling point for the Nine Mile Point site. The Oswego Steam Station inlet canal removes water from Lake Ontario at a point approximately 7.6 miles west of the site. This "upstream" location is considered a control location because of the distance from the site as well as the result of the lake current patterns and current patterns from the Oswego River located nearby.

Samples from the JAFNPP facility are composited from automatic sampling equipment which discharges into a compositing tank or bottles. Samples are collected monthly from the compositor and analyzed for gamma emitters. Samples from the Oswego Steam Station are also obtained using automatic sampling equipment and collected in a holding tank. Representative samples from this location are obtained weekly and are composited to form a monthly composite sample. The monthly samples are analyzed for gamma emitting radionuclides.

A portion of the monthly sample from each of the locations is saved and composited to form quarterly composite samples, which are analyzed for tritium.

In addition to the sample results for the JAFNPP and Oswego Steam Station collection sites, data is presented for the Nine Mile Point Unit 1 and Unit 2 facility inlet canal samples and from the City of Oswego drinking water supply. The latter three locations are not required by the TS/ODCM. These locations are optional sample points, which are collected and analyzed to enhance the surface water sampling program. Monthly composite samples from these three locations are analyzed for gamma emitting nuclides and quarterly composite samples are analyzed for tritium.

Surface water sample locations are shown in Section 3.3 on Figure 3.3-4.

3.1.4 AIR PARTICULATE / IODINE

The air sampling stations required by the TS/ODCM are located in the general area of the site boundary. The sampling stations are sited within a distance of 0.2 miles of the site boundary in sectors with the highest calculated deposition factor (D/Q) based on historical meteorological data. These stations (R-1, R-2, and R-3) are located in the E, ESE, and SE sectors as measured from the center of the Nine Mile Point Nuclear Station Unit 2 Reactor Building. The TS/ODCM also require that a fourth air sampling station be located in the vicinity of a year round community. This station is located in the SE sector at a distance of 1.8 miles and is designated as Station R-4. A fifth station required by the TS/ODCM is a control location designated as Station R-5. Station R-5 is located 16.4 miles from the site in the NE meteorological sector.

In addition to the five TS/ODCM required locations, there are ten additional sampling stations. Six of these sampling stations are located within the site boundary and are designated as On-Site Stations D1, G, H, I, J, and K. These locations are within the site boundary of the NMPNS and JAFNPP. One air sampling station is located Off-Site in the southwest sector in the vicinity of the City of Oswego and is designated as Station G Off-Site. Three remaining air sampling stations are located in the ESE, SSE, and S sectors and range in distance from 7.2 to 9.0 miles. These are designated as Off-Site Stations D2, E and F respectively.

Each station collects airborne particulates using glass fiber filters (47 millimeter diameter) and radioiodine using charcoal cartridges (2x1 inch). The samplers run continuously and the charcoal cartridges and particulate filters are changed on a weekly basis. Sample volume is determined by use of calibrated gas flow meters located at the sample discharge. Gross beta analysis is performed on each particulate filter. Charcoal cartridges are analyzed for radioiodine using gamma spectral analysis. The particulate filters are composited monthly by location and analyzed for gamma emitting radionuclides.

Air sampling station locations are shown in Section 3.3, Figures 3.3-2 and 3.3-3.

3.1.5 TLD (DIRECT RADIATION)

Thermoluminescent dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the environment. Environmental TLDs are supplied and processed quarterly by the JAFNPP Environmental Laboratory. The laboratory utilizes a Panasonic based system using UD-814 dosimeters, which are constructed of rectangular teflon wafers impregnated with 25% $CaSO_4$:Dy phosphor. Each dosimeter contains three calcium sulfate elements and one lithium borate element.

A. Environmental TLDs

Environmental TLDs are placed in five different geographical regions around site to evaluate effects of Direct Radiation as a result of Plant Operations. The following is a description of the five TLD geographical categories used in the NMPNS and JAFNPP Environmental Monitoring Program and the TLDs that make up each region:

TLD Geographical Category	Description
On-site	TLDs placed at various locations within the Site Boundary and are not required by the TS/ODCM. (TLD locations comprising this group are: 3, 4, 5, 6, 7, 23*, 24, 25, 26, 27, 28, 29, 30, 31, 39, 47, 18*, 103, 106 and 107)
Site Boundary	An inner ring of TLDs placed in the general area of the Site Boundary in each of the sixteen meteorological sectors. This category is required by TS/ODCM. (TLD locations comprising this group are: 75*, 76*, 77*, 78*, 79*, 80*, 81*, 82*, 83*, 84, 7*, 18*, 85*, 86*, 87* and 23*)
Off-site Sector	An outer ring of TLDs placed 4 to 5 miles from the site in each of the 8 land based meteorological sectors. This category is required by TS/ODCM. (TLD locations comprising this group are 88*, 89*, 90*, 91*, 92*, 93*, 94*, 95*)

TLD Geographical Category	Description
Special Interest	TLDs placed in Special Interest areas of high population density and use. These TLDs are located at or near large industrial sites, schools, or nearby towns or communities. This category is required by the TS/ODCM. (TLD locations comprising this group are: 9, 10, 11, 12, 13, 15*, 19, 51, 52, 53, 54, 55, 56*, 58*, 96*, 97*, 98*, 99, 100, 101, 102, 108, and 109)
Control	TLDs placed in areas beyond significant influence of the site and plant operations. These TLDs are located to the SW, S and NE of the site at distances of 12.6 to 24.7 miles. This category is also required by the TS/ODCM. (TLD locations comprising this group are 14*, 49*, 8, 111, 113)

* TLD location required by TS/ODCM

Although the TS/ODCM require a total of 32 TLD stations, environmental TLDs are also placed at additional locations, not required by the TS/ODCM, within the On-site, Special Interest and Control TLD categories to supplement the TS/ODCM required direct radiation readings.

Two dosimeters are placed at each TLD monitoring location. The TLDs are sealed in polyethylene packages to ensure dosimeter integrity and placed in open webbed plastic holders and attached to supporting structures, such as utility poles.

Environmental TLD locations are shown in Section 3.3, Figures 3.3-2 and 3.3-3.

B. Independent Spent Fuel Storage Installation (ISFSI)

In order to provide adequate spent fuel storage capacity at the FitzPatrick plant, Entergy constructed an Independent Spent Fuel Storage Installation (ISFSI) on site. On April 25, 2002, the ISFSI facility was placed in service.

TLDs are used to monitor direct radiation levels in the vicinity of the ISFSI facility. Twelve TLD locations were established around the ISFSI pad on the perimeter fence. Six additional TLD locations are located at varying distances from the pad to determine dose rates at points of interest relative to the storage area. Background data was collected starting in October 2000 at eight of the TLD locations on the perimeter fence. The remaining locations were established in October 2001.

Two dosimeters are placed at each TLD monitoring location. The TLDs are sealed in polyethylene packages to ensure dosimeter integrity and placed in the field using a supporting structure such as a fence or other immovable object.

Environmental TLD locations are shown in Section 3.3. TLD results are found on Table 6-10.

3.1.6 MILK

Milk samples were routinely collected from six farms during the year. These farms included five indicator locations and one control location. Samples are collected twice per month, April through December and each sample is analyzed for gamma emitting radionuclides and I-131. Samples are collected in January, February and March in the event that I-131 is detected in November and December of the preceding year.

The selection of milk sample locations is based on maximum deposition calculations (D/Q). Deposition values are generated using average historical meteorological data for the site. The TS/ODCM require three sample locations within 5.0 miles of the site with the highest calculated deposition value. During 2002, there were no milk sample locations within 5.0 miles that were suitable for sampling based on production capabilities. There were however, five optional locations beyond five miles that were sampled as indicator locations for the 2002 routine milk sampling program.

The TS/ODCM also requires that a sample be collected from a location nine to twenty miles from the site and in the least prevalent wind direction. This location is in the SSW sector and serves as the control location.

Milk samples are collected in polyethylene bottles from a bulk storage tank at each sampled farm. Before the sample is drawn, the tank contents are agitated to assure a homogenous mixture of milk and butterfat. Two gallons are collected from each indicator and control location during the first half and second half of each month. The samples are chilled, preserved and shipped fresh to the analytical laboratory within thirty-six hours of collection in insulated shipping containers.

The milk sample locations are shown in Section 3.3, Figure 3.3-4. (Refer to Section 3.3, Table 3.3-1 for location designation and descriptions.)

3.1.7 FOOD PRODUCTS (VEGETATION)

Food products are collected once per year during the late summer harvest season. A minimum of three different kinds of broad leaf vegetation (edible or inedible) are collected from two different indicator garden locations. Sample locations are selected from gardens identified in the annual census that have the highest estimated deposition values (D/Q) based on historical site meteorological data. Control samples are also collected from available locations greater than 9.3 miles distant from the site in a less prevalent wind direction. Control samples are of the same or similar type of vegetation when available.

Food product samples are analyzed for gamma emitters using gamma isotopic analysis.

Food product locations are shown in Section 3.3, Figure 3.3-5.

3.2 ANALYSES PERFORMED

The majority of environmental sample analyses are performed by the James A. FitzPatrick Nuclear Power Plant (JAFNPP) Environmental Laboratory. Tritium analyses for samples collected during 2002 were performed by Framatome ANP Environmental Laboratory. The following samples are analyzed at the JAFNPP Environmental Lab:

- Shoreline Sediment – gamma spectral analysis
- Fish – gamma spectral analysis
- Surface Water Monthly Composites – gamma spectral analysis, I-131
- Air Particulate Filter – gross beta
- Air Particulate Filter Composites – gamma spectral analysis
- Airborne Radioiodine – gamma spectral analysis
- Direct Radiation – Thermoluminescent Dosimeters (TLDs)
- Milk – gamma spectral analysis and I-131
- Food Products (Vegetation) – gamma spectral analysis
- Special Samples (soil, food products, bottom sediment, etc.) – gamma spectral analysis

3.3 SAMPLE LOCATIONS

Section 3.3 provides maps illustrating sample locations. Sample locations referenced as letters and numbers on the report period data tables are consistent with designations plotted on the maps.

This section also contains an environmental sample location reference table (Table 3.3-1). This table contains the following information:

- Sample Medium
- Location designation, (this column contains the key for the sample location and is consistent with the designation on the sample location maps and on the sample results data tables).
- Location description
- Degrees and distance of the sample location from the site.

3.3.1 LIST OF FIGURES

TABLE 3.3-1

2002 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)
Shoreline Sediment	05*	Figure 3.3-5	Sunset Bay	80º at 1.5 miles
	06	Figure 3.3-5	Langs Beach, Control	230° at 5.8 miles
Fish	02*	Figure 3.3-5	Nine Mile Point Transect	315° at 0.3 miles
	03*	Figure 3.3-5	FitzPatrick Transect	55° at 0.6 miles
	00*	Figure 3.3-5	Oswego Transect	235° at 6.2 miles
Surface Water	03*	Figure 3.3-4	FitzPatrick Inlet	70° at 0.5 miles
	08*	Figure 3.3-4	Oswego Steam Station Inlet	235° at 7.6 miles
	09	Figure 3.3-4	NMP Unit 1 Inlet	275° at 0.3 miles
	10	Figure 3.3-4	Oswego City Water	240° at 7.8 miles
	11	Figure 3.3-4	NMP Unit 2 Inlet	304° at 0.1 miles
Air Radioiodine and Particulates	R-1*	Figure 3.3-2	R-1 Station, Nine Mile Point Road	88° at 1.8 miles
	R-2*	Figure 3.3-3	R-2 Station, Lake Road	104° at 1.1 miles
	R-3*	Figure 3.3-3	R-3 Station, Co. Rt. 29	132° at 1.5 miles
	R-4*	Figure 3.3-3	R-4 Station, Co. Rt. 29	143° at 1.8 miles
	R-5*	Figure 3.3-2	R-5 Station, Montario Point	42° at 16.4 miles
	D-1	Figure 3.3-3	D1 On-Site Station	69° at 0.2 miles
	G	Figure 3.3-3	G On-Site Station	250° at 0.7 miles
	H	Figure 3.3-3	H On-Site Station	70° at 0.8 miles
	I	Figure 3.3-3	I On-Site Station	98° at 0.8 miles
	J	Figure 3.3-3	J On-Site Station	110° at 0.9 miles
	K	Figure 3.3-3	K On-Site Station	132° at 0.5 miles
	G	Figure 3.3-2	G Off-Site Station, Saint Paul Street	225° at 5.3 miles
	D-2	Figure 3.3-2	D2 Off-Site Station, Rt. 64	117° at 9.0 miles
	E	Figure 3.3-2	E Off-Site Station, Rt. 4	160° at 7.2 miles
	F	Figure 3.3-2	F Off-site Station, Dutch Ridge Road	190° at 7.7 miles

(1) Degrees and distance based on Nine Mile Point Unit 2 Reactor Centerline
* Sample location required by TS/ODCM

TABLE 3.3-1 (Continued)

2002 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)
Thermoluminescent Dosimeters (TLD) (Continued)	3	Figure 3.3-3	D1 On-Site Station	69° at 0.2miles
	4	Figure 3.3-3	D2 On-Site Station	140° at 0.4miles
	5	Figure 3.3-3	E On-Site Station	175° at 0.4miles
	6	Figure 3.3-3	F On-Site Station	210° at 0.5miles
	7*	Figure 3.3-3	G On-Site Station	250° at 0.7miles
	8	Figure 3.3-2	R-5 Off-Site Station	42° at 16.4miles
	9	Figure 3.3-2	D1 Off-Site Station	80° at 11.4miles
	10	Figure 3.3-2	D2 Off-Site Station	117° at 9.0miles
	11	Figure 3.3-2	E Off-Site Station	160° at 7.2miles
	12	Figure 3.3-2	F Off-Site Station	190° at 7.7miles
	13	Figure 3.3-2	G Off-Site Station	225° at 5.3miles
	14*	Figure 3.3-2	Southwest Oswego – Control	226° at 12.6miles
	15*	Figure 3.3-2	West Site Boundary	237° at 0.9miles
	18*	Figure 3.3-3	Energy Information Center	265° at 0.4miles
	19	Figure 3.3-2	East Site Boundary	81° at 1.3miles
	23*	Figure 3.3-3	H On-Site Station	70° at 0.8miles
	24	Figure 3.3-3	I On-Site Station	98° at 0.8miles
	25	Figure 3.3-3	J On-Site Station	110° at 0.9miles
	26	Figure 3.3-3	K On-Site Station	132° at 0.5miles
	27	Figure 3.3-3	North Fence, JAFNPP	60° at 0.4miles
	28	Figure 3.3-3	North Fence, JAFNPP	68° at 0.5miles
	29	Figure 3.3-3	North Fence JAFNPP	65° at 0.5miles
	30	Figure 3.3-3	North Fence JAFNPP	57° at 0.4miles
	31	Figure 3.3-3	North Fence NMP-1	276° at 0.2miles
	39	Figure 3.3-3	North Fence NMP-1	292° at 0.2miles
	47	Figure 3.3-3	North Fence JAFNPP	69° at 0.6miles
	49*	Figure 3.3-2	Phoenix, NY – Control	170° at 19.8miles
	51	Figure 3.3-2	Oswego Steam Station, East	223° at 7.4miles
	52	Figure 3.3-2	Fitzhugh Park Elem. School, East	227° at 5.8miles
	53	Figure 3.3-2	Fulton High School	183° at 13.7miles

(1) Degrees and distance based on Nine Mile Point Unit 2 Reactor Centerline
* Sample location required by TS/ODCM

TABLE 3.3-1 (Continued)

2002 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)
Thermoluminescent Dosimeters (TLD) (Continued)	54	Figure 3.3-2	Mexico High School	115° at 9.3 miles
	55	Figure 3.3-2	Pulaski Gas Substation, Rt. 5	75° at 13.0 miles
	56*	Figure 3.3-2	New Haven Elementary School	123° at 5.3 miles
	58*	Figure 3.3-2	County Route 1 and Alcan	220° at 3.1 miles
	75*	Figure 3.3-3	North Fence, NMP-2	5° at 0.1 miles
	76*	Figure 3.3-3	North Fence, NMP-2	25° at 0.1 miles
	77*	Figure 3.3-3	North Fence, NMP-2	45° at 0.2 miles
	78*	Figure 3.3-3	East Boundary, JAFNPP	90° at 1.0 miles
	79*	Figure 3.3-3	County Route 29	115° at 1.1 miles
	80*	Figure 3.3-3	County Route 29	133° at 1.4 miles
	81*	Figure 3.3-3	Miner Road	159° at 1.6 miles
	82*	Figure 3.3-3	Miner Road	181° at 1.6 miles
	83*	Figure 3.3-3	Lakeview Road	200° at 1.2 miles
	84*	Figure 3.3-2	Lakeview Road	225° at 1.1 miles
	85*	Figure 3.3-3	North Fence, NMP-1	294° at 0.2 miles
	86*	Figure 3.3-3	North Fence, NMP-1	315° at 0.1 miles
	87*	Figure 3.3-3	North Fence, NMP-2	341° at 0.1 miles
	88*	Figure 3.3-2	Hickory Grove Road	97° at 4.5 miles
	89*	Figure 3.3-2	Leavitt Road	111° at 4.1 miles
	90*	Figure 3.3-2	Route 104 and Keefe Road	135° at 4.2 miles
	91*	Figure 3.3-2	County Route 51A	156° at 4.8 miles
	92*	Figure 3.3-2	Maiden Lane Road	183° at 4.4 miles
	93*	Figure 3.3-2	County Route 53	205° at 4.4 miles
	94*	Figure 3.3-2	Country Route 1 and Kocher Road	223° at 4.7 miles
	95*	Figure 3.3-2	Lakeshore Camp Site	237° at 4.1miles
	96*	Figure 3.3-2	Creamery Road	199° at 3.6 miles
	97*	Figure 3.3-3	County Route 29	143° at 1.8 miles
	98*	Figure 3.3-2	Lake Road	101° at 1.2 miles

(1) Degrees and distance based on Nine Mile Point Unit 2 Reactor Centerline
* Sample location required by TS/ODCM

TABLE 3.3-1 (Continued)

2002 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)
Thermoluminescent Dosimeters (TLD) (Continued)	99	Figure 3.3-2	Nine Mile Point Road	88° at 1.8 miles
	100	Figure 3.3-3	Country Route 29 and Lake Road	104° at 1.1 miles
	101	Figure 3.3-3	County Route 29	132° at 1.5 miles
	102	Figure 3.3-2	Oswego County Airport	175° at 11.9 miles
	103	Figure 3.3-3	Energy Center, East	267° at 0.4 miles
	104	Figure 3.3-2	Parkhurst Road	102° at 1.4 miles
	105	Figure 3.3-3	Lakeview Road	198° at 1.4 miles
	106	Figure 3.3-3	Shoreline Cove, West of NMP-1	274° at 0.3 miles
	107	Figure 3.3-3	Shoreline Cove, West of NMP-1	272° at 0.3 miles
	108	Figure 3.3-3	Lake Road	104° at 1.1 miles
	109	Figure 3.3-3	Lake Road	103° at 1.1 miles
	111*	Figure 3.3-2	Sterling, NY – Control	214° at 21.8miles
	113	Figure 3.3-2	Baldwinsville, NY – Control	178° at 24.7miles
Cows Milk	76	Figure 3.3-4	Indicator Location	132° at 5.2 miles
	50	Figure 3.3-4	Indicator Location	93° at 8.2 miles
	55	Figure 3.3-4	Indicator Location	95° at 9.0 miles
	60	Figure 3.3-4	Indicator Location	90° at 9.5 miles
	4	Figure 3.3-4	Indicator Location	113° at 7.8 miles
	77*	Figure 3.3-4	Control Location	191° at 13.9 miles
Food Products	133*	Figure 3.3-5	Indicator Location	96° at 1.7 miles
	132*	Figure 3.3-5	Indicator Location	115° at 1.9 miles
	143	Figure 3.3-5	Indicator Location	137° at 1.7 miles
	342	Figure 3.3-5	Indicator Location	96° at 1.7 miles
	145*	Figure 3.3-5	Control Location	225° at 15.6 miles

(1) Degrees and distance based on Nine Mile Point Unit 2 Reactor Centerline
* Sample location required by TS/ODCM

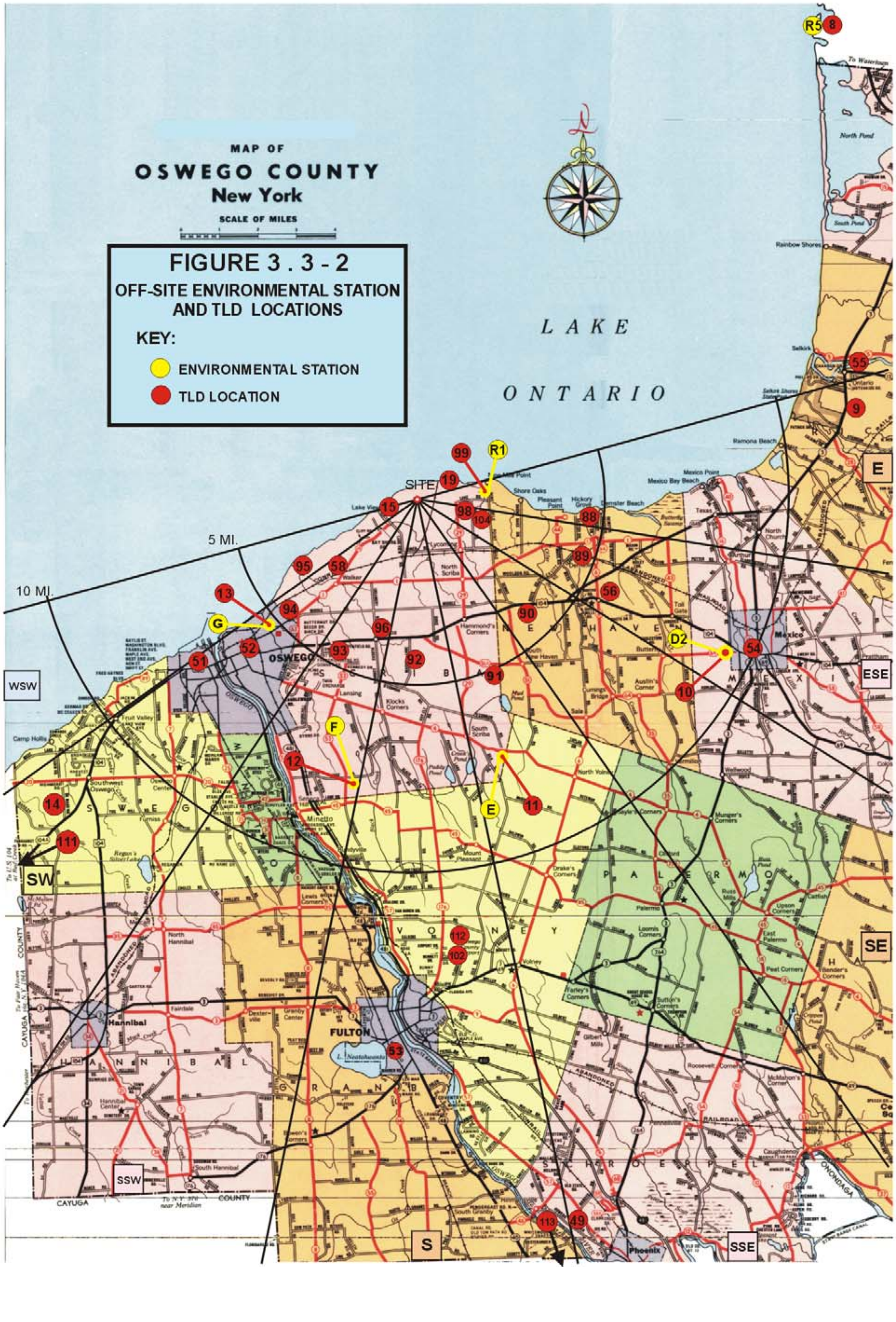
TABLE 3.3-1 (Continued)

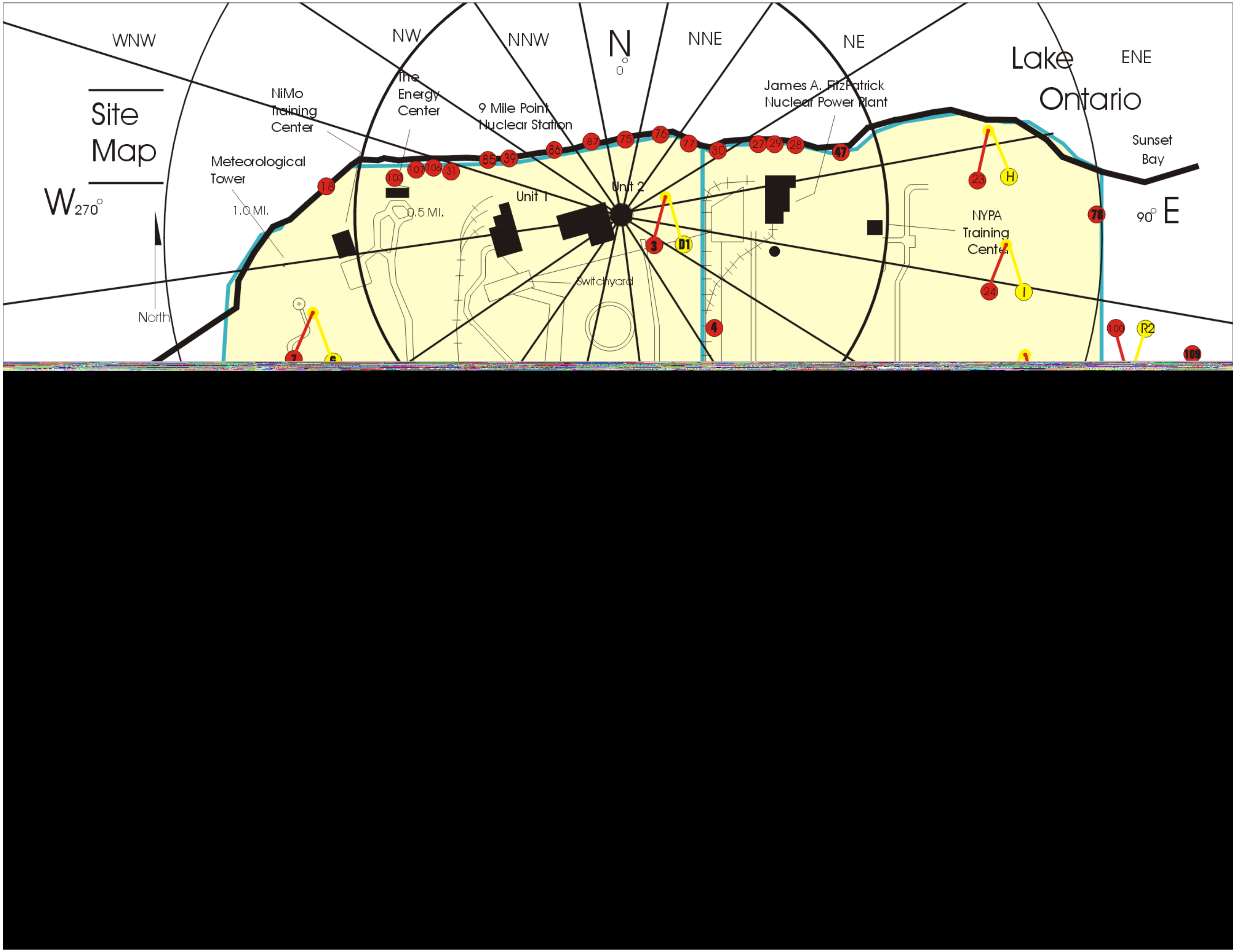
2002 ENVIRONMENTAL SAMPLE LOCATIONS

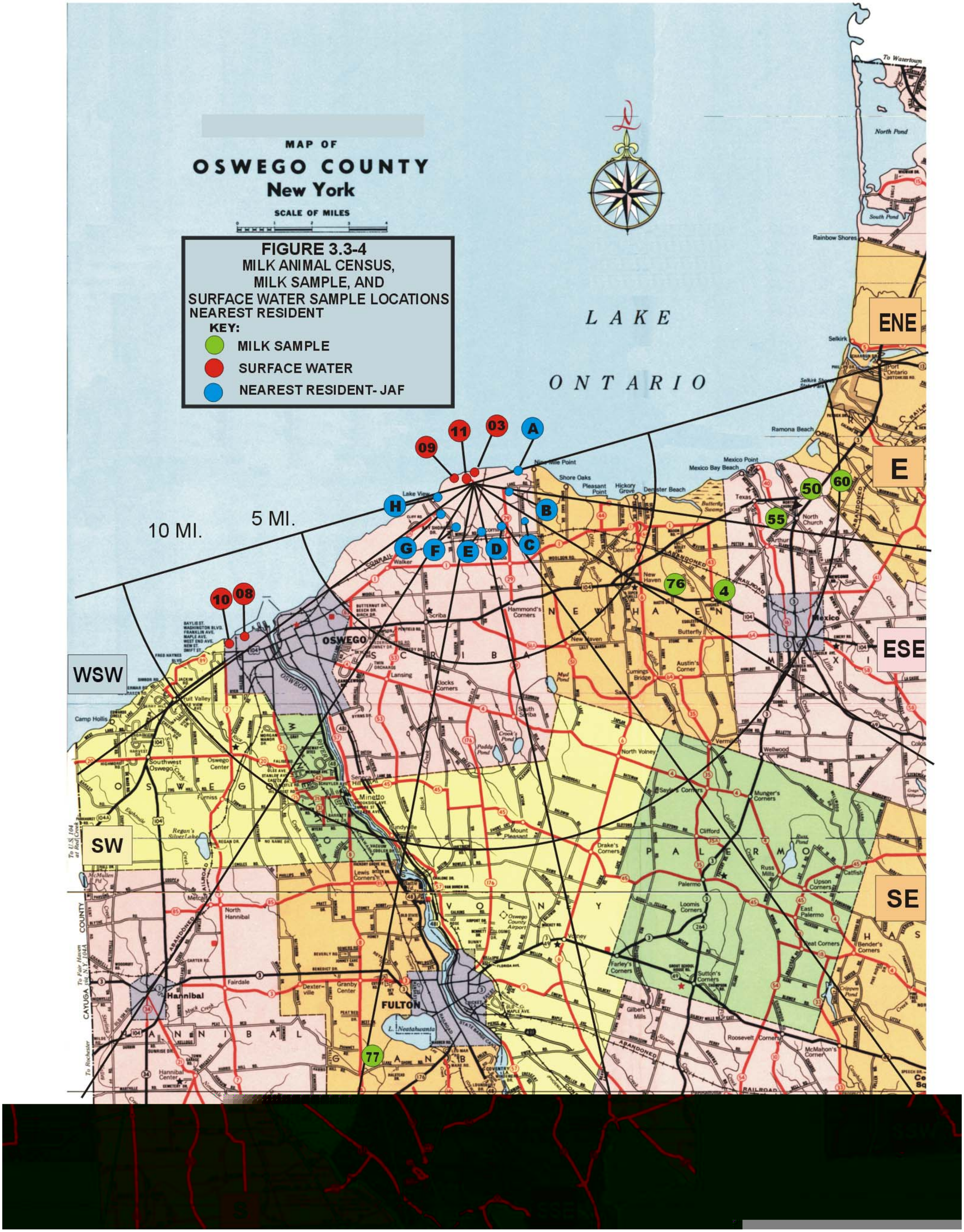
SAMPLE MEDIUM	LOCATION DESIGNATION	LOCATION DESCRIPTION
Thermoluminescent Dosimeters TLD) (Continued)	I-1*	ISFSI West Fence, South End of Storage Pad
	I-2*	ISFSI West Fence, Center of Storage Pad
	I-3*	ISFSI West Fence, North End of Storage Pad
	I-4*	ISFSI North Fence, West End of Storage Pad
	I-5*	ISFSI North Fence, Center of Storage Pad
	I-6*	ISFSI North Fence, East End of Storage Pad
	I-7*	ISFSI East Fence, North End of Storage Pad
	I-8*	ISFSI East Fence, Center of Storage Pad
	I-9*	ISFSI East Fence, South End of Storage Pad
	I-10*	ISFSI South Fence, East End of Storage Pad
	I-11*	ISFSI South Fence, Center of Storage Pad
	I-12*	ISFSI South Fence, West End of Storage Pad
	I-13H	ISFSI Building and Grounds Garage, East of Pad
	I-14H	ISFSI Tree ~100 yards South of Pad
	I-15H	ISFSI Transmission Line Tower South of Pad at East /West Access Road
	I-16H	ISFSI Perimeter Fence ~100 yards West of Pad on Pad Centerline
	I-17H	ISFSI North Fence of Main Switch Yard on Pad Centerline
	I-18H	ISFSI North Inner Perimeter Fence at Lake Shore on Pad Centerline

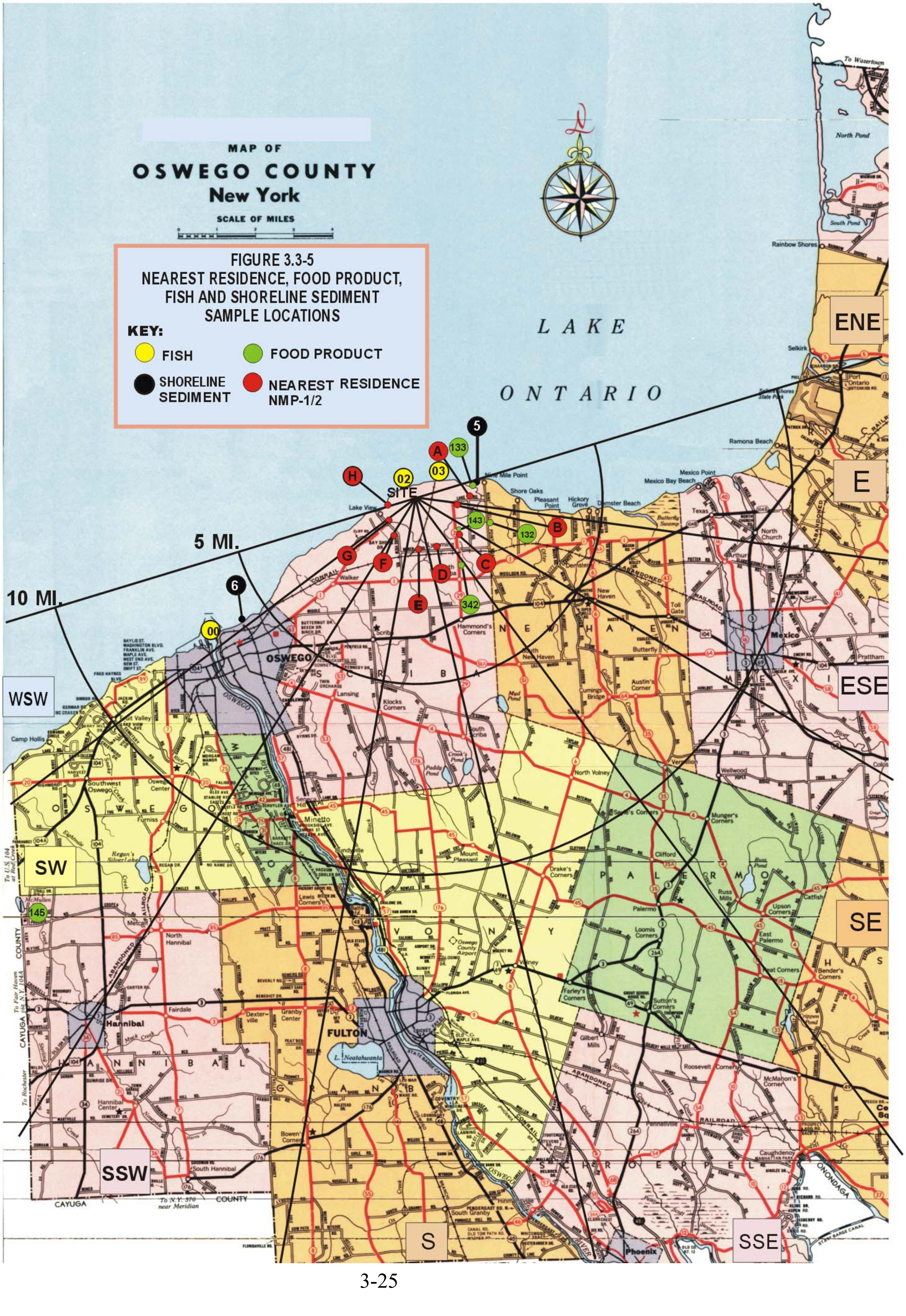
* Sample location required by ODCM
H Optional TLD location

Figure 3.3.-1
NEW YORK STATE MAP


MAP OF
OSWEGO COUNTY
New York
SCALE OF MILES
FIGURE 3 . 3 - 2
OFF-SITE ENVIRONMENTAL STATION AND TLD LOCATIONS
KEY:
ENVIRONMENTAL STATION
TLD LOCATION
LAKE
ONTARIO
SITE
5 MI.
10 MI.
OSWEGO
FULTON
WSW
SW
SSW
S
SSE
SE
ESE
E
R5
8
55
9
R1
99
19
15
98
104
88
89
95
58
13
94
G
52
51
96
93
92
91
90
56
D2
54
10
F
12
E
11
14
111
112
102
53
113
49


Site
Map
WNW
NW
NNW
N
0°
NNE
NE
Lake
Ontario
ENE
NiMo
Training
Center
The
Energy
Center
9 Mile Point
Nuclear Station
James A. FitzPatrick
Nuclear Power Plant
Sunset
Bay
Meteorological
Tower
W 270°
1.0 MI.
0.5 MI.
Unit 1
Unit 2
NYPA
Training
Center
90° E
Switchyard
North


MAP OF
OSWEGO COUNTY
New York
SCALE OF MILES
FIGURE 3.3-4
MILK ANIMAL CENSUS,
MILK SAMPLE, AND
SURFACE WATER SAMPLE LOCATIONS
NEAREST RESIDENT
KEY:
MILK SAMPLE
SURFACE WATER
NEAREST RESIDENT- JAF
LAKE
ONTARIO
10 MI.
5 MI.
09
11
03
A
B
C
D
E
F
G
H
10
08
76
4
50
60
55
77
ENE
E
ESE
SE
WSW
SW
OSWEGO
FULTON
Mexico
Hannibal


MAP OF
OSWEGO COUNTY
New York
SCALE OF MILES
FIGURE 3.3-5
NEAREST RESIDENCE, FOOD PRODUCT,
FISH AND SHORELINE SEDIMENT
SAMPLE LOCATIONS
KEY:
FISH
FOOD PRODUCT
SHORELINE SEDIMENT
NEAREST RESIDENCE NMP-1/2
LAKE
ONTARIO
SITE
5 MI.
10 MI.
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
OSWEGO
FULTON
Hannibal
Mexico
Phoenix

3.4 LAND USE CENSUS

The TS/ODCM require that a milch animal census and a residence census be conducted annually. Milch animals are defined as any animal that is routinely used to provide milk for human consumption.

The milch animal census is an estimation of the number of cows and goats within an approximate ten mile radius of the Nine Mile Point Site. The census is done once per year in the summer. It is conducted by sending questionnaires to previous milch animal owners, and by road surveys to locate any possible new owners. In the event that questionnaires are not answered, the owners are contacted by telephone or in person. The Oswego County Cooperative Extension Service was also contacted to provide any additional information.

The residence census is conducted each year to identify the closest residence in each of the 22.5 degree meteorological sectors out to a distance of five miles. A residence, for the purposes of this census, is a residence that is occupied on a part time basis (such as a summer camp), or on a full time, year round basis. Several of the site meteorological sectors are over Lake Ontario, therefore, there are only eight sectors over land where residences are located within five miles.

In addition to the milch animal and residence census, a garden census is performed. The census is conducted each year to identify the gardens near the site that are to be used for the collection of food product samples. The results of the garden census are not provided in this report. The results are used only to identify appropriate sample locations. The garden census is not required by the TS/ODCM if broadleaf vegetation sampling and analysis is performed.

3.5 CHANGES TO THE REMP PROGRAM

The following changes were implemented during the 2002 sampling program:

A. FOOD PRODUCT/VEGETATION

The food product/vegetation sample locations are evaluated each sampling season based on meteorology and product availability. The following sample location changes were implemented in 2002:

- The sampling program did not utilize food product vegetation locations (Battles, Hall, Lee, and Vitullo) sampled in 2001 for the 2002 sampling program. These locations were not sampled due to the general unavailability of samples.

- The 2002 Land Use Census identified a new garden location that was sampled as an optional location due to limited produce availability. The garden is located in the east sector (96°) at a distance of 1.7 miles

There were no changes to the program outlined by the TS/ODCM.

3.6 DEVIATION AND EXCEPTIONS TO THE PROGRAM

Exceptions to the 2002 sample program concern those samples or monitoring requirements, which are required by the TS/ODCM. This section reports samples that were not collected or available as required by table TS/ODCM Part 1, Table 5.1-1.

A. TS/ODCM Program Deviations

The following are deviations from the program specified by the TS/ODCM:

1. The air sampling pump at the R-1 Environmental Sampling Station was inoperable for approximately 5.5 hours during the sample period of 2/5/02 through 2/12/02. The inoperability of the sampling pumps was caused by a power outage which was weather related. No corrective action was implemented.

2. The air sampling pumps at the R-1 and R-2 Environmental Sampling Stations were inoperable for approximately 2.5 hours on 5/9/02. The inoperability of the sampling pumps was caused by an electrical power outage initiated by Niagara Mohawk Power for line maintenance as a result of a fallen tree. No corrective action was implemented.

3. The air sampling pumps at the R-1 and R-2 Environmental Sampling Stations were inoperable for approximately 1.3 hours on 11/2/02. The inoperability of the sampling pumps was caused by a power outage which was weather related. No corrective action was implemented.

4. Thermoluminescent Dosimeter (TLD) number 91, which is required by the TS/ODCM, was discovered to be missing during the 2002 first quarter changeout. A new TLD was placed at that location.

B. Air Sampling Station Operability Assessment

The TS/ODCM required air sampling program consists of 5 individual sampling locations. The collective operable time period for the air monitoring stations was 43,787 hours out of a possible 43,800. The air sampling availability factor for the report period was 99.97%.

3.7 STATISTICAL METHODOLOGY

There are a number of statistical calculation methodologies used in evaluating the data from the environmental monitoring program. These methodologies include determination of standard deviation, the mean and associated error for the mean and the lower limit of detection (LLD).

3.7.1 ESTIMATION OF THE MEAN AND STANDARD DEVIATION

The mean, (X), and standard deviation, (s), were used in the reduction of the data generated by the sampling and analysis of the various media in the JAFNPP Radiological Environmental Monitoring Program (REMP). The following equations were utilized to compute the mean (X) and the standard deviation(s):

A. Mean

$$\overline{\mathbf{X}} = \frac{\sum_{\mathbf{i}=1}^{\mathbf{n}} \mathbf{X_i}}{\mathbf{N}}$$

Where,

$\overline{X}$ = estimate of the mean.

i = individual sample, i.

N, n = total number of samples with positive indications.

X_i = value for sample i above the lower limit of detection.

B. Standard Deviation

$$\mathbf{s} = \left[\frac{\sum_{\mathbf{i}=1}^{\mathbf{n}} (\mathbf{X_i} - \overline{\mathbf{X}})^2}{(\mathbf{N}-1)} \right]^{1/2}$$

Where,

$\overline{X}$ = mean for the values of X

s = standard deviation for the sample population.

3.7.2 ESTIMATION OF THE MEAN AND THE ESTIMATED ERROR FOR THE MEAN

In accordance with program policy, two recounts of samples are performed when the initial count indicates the presence of a plant related radionuclide(s). When a radionuclide is positively identified in two or more counts, the analytical result for the radionuclide is reported as the mean of the positive detections and the associated propagated error for that mean. In cases where more than one positive sample result is available, the mean of the sample results and the estimated error for the mean are reported in the Annual Report.

The following equations were utilized to estimate the mean (X) and the associated propagated error.

A. Mean

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{N}$$

Where,

X = estimate of the mean.
i = individual sample, i.
N,n = total number of samples with positive indications.
X_i = value for sample i above the lower limit of detection.

B. Error of the Mean (Reference 18)

$$\textbf{ERROR MEAN} = \frac{\left[\sum_{i=1}^{n} (\textbf{ERROR})^2\right]^{1/2}}{\textbf{N}}$$

Where,

ERROR MEAN	=	propagated error
i	=	individual sample
ERROR	=	1 sigma* error of the individual analysis
N, n	=	number of samples with positive indications

* Sigma (σ)

Sigma is the Greek letter used to represent the mathematical term <u>Standard Deviation</u>. <u>Standard Deviation</u> is a measure of dispersion from the arithmetic mean of a set of numbers.

3.7.3 LOWER LIMIT OF DETECTION (LLD)

The LLD is the predetermined concentration or activity level used to establish a detection limit for the analytical procedures.

The LLDs are specified by the TS/ODCM for radionuclides in specific media and are determined by taking into account the overall measurement methods. The equation used to calculate the LLD is:

$$LLD = \frac{4.66\ s_b}{(E)\ (V)\ (2.22)\ (Y)\ \exp(-\lambda \Delta t)}$$

Where:

LLD = the a priori lower limit of detection, as defined above (in picocuries per unit mass or volume);

s_b = the standard deviation of the background counting rate or of the counting rate of a blank sample, as appropriate (in counts per minute);

E = the counting efficiency (in counts per disintegration);

V = the sample size (in units of mass or volume);

2.22 = the number of disintegrations per minute per picocurie;

Y = the fractional radiochemical yield (when applicable);

λ = the radioactive decay constant for the particular radionuclide;

Δt = the elapsed time between sample collection (or end of the sample collection period) and time of counting.

The TS/ODCM LLD formula assumes that:

- The counting times for the sample and background are equal.

- The count rate of the background is approximately equal to the count rate of the sample.

In the TS/ODCM program, LLDs are used to ensure that minimum acceptable detection capabilities are met with specified statistical confidence levels (95% detection probability with 5% probability of a false negative). Table 3.8-1 lists the TS/ODCM program required LLDs for specific media and radionuclides as specified by the NRC. The LLDs actually achieved are routinely much lower than those specified by the TS/ODCM.

3.8 COMPLIANCE WITH REQUIRED LOWER LIMITS OF DETECTION (LLD)

Table 6.1-3 of the Radiological Effluent Technical Specification (RETS) and the subsequent ODCM, Part 1, Table 5.1-3 specify the detection capabilities for environmental sample analysis (see Report Table 3.8-1). Section 7.3.d of the RETS and subsequent ODCM, Part 1, Section 6.1 require that a discussion of all analyses for which the required LLDs specified were not routinely achieved be included in the Annual Radiological Environmental Operating Report. Section 3.8 is provided pursuant to this requirement.

3.8.1 All sample analyses performed in 2002, as required by the TS/ODCM, achieved the Lower Limit of Detection (LLD) as specified.

TABLE 3.8-1

REQUIRED DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS LOWER LIMIT OF DETECTION (LLD)

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
Gross Beta	4	0.01				
H-3	3000 (a)					
Mn-54	15		130			
Fe-59	30		260			
Co-58, Co-60	15		130			
Zn-65	30		260			
Zr-95, Nb-95	15					
I-131	15 (a)	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba/La	15			15		

(a) No drinking water pathway exists at the Nine Mile Point Site under normal operating conditions due to the direction and distance of the nearest drinking water intake. Therefore an LLD value of 3000 pCi/liter is used for H-3 and an LLD value of 15 pCi/liter is used for I-131.

3.9 REGULATORY LIMITS

Two federal agencies, the Nuclear Regulatory Commission and Environmental Protection Agency, have responsibility for regulations promulgated for protecting the public from radiation and radioactivity beyond the site boundary.

3.9.1 The Nuclear Regulatory Commission (NRC):

The NRC, in 10 CFR 20.1301 limits the levels of radiation in unrestricted areas resulting from the possession or use of radioactive materials such that they limit any individual to a dose of:

- less than or equal to 100 mrem per year to the total body.

In addition to this dose limit, the NRC has established design objectives for nuclear plant licensees. Conformance to these guidelines ensures that nuclear power reactor effluents are maintained as far below the legal limits as is reasonably achievable.

The NRC, in 10CFR 50, Appendix I, establishes design objectives for the dose to a member of the general public from radioactive material in liquid effluents released to unrestricted areas to be limited to:

- less than or equal to 3 mrem per year to the total body
  and
- less than or equal to 10 mrem per year to any organ.

The air dose due to release of noble gases in gaseous effluents is restricted to:

- less than or equal to 10 mrad per year for gamma radiation and
- less than or equal to 20 mrad per year for beta radiation.

The dose to a member of the general public from iodine-131, tritium, and all particulate radionuclides with half-lives greater than 8 days in gaseous effluents is limited to:

- less than or equal to 15 mrem per year to any organ.

The NRC, in 10CFR72.104(a) establishes criteria for radioactive materials in effluents and direct radiation from an Independent Spent Fuel Storage Installation (ISFSI).

During normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed:

- less than or equal to 25 mrem per year to the total body;
- less than or equal to 75 mrem per year to the thyroid
  and
- less than or equal to 25 mrem per year to any other organ as a result of :

  1. Planned discharges of radioactive material, radon and its decay products excepted, to the environment.
  2. Direct radiation from ISFSI.
  3. Any other radiation from fuel cycle operation in the region.

3.9.2 Environmental Protection Agency (EPA).

The EPA, in 40CFR190.10 Subpart B, sets forth the environmental standards for the uranium fuel cycle. During normal operation, the annual dose to any member of the public from the entire uranium fuel cycle shall be limited to:

- less than or equal to 25 mrem per year to the total body,
- less than or equal to 75 mrem per year to the thyroid
  and
- less than or equal to 25 mrem per year to any other organ.

4.0 SAMPLE SUMMARY TABLES IN BRANCH TECHNICAL POSITION FORMAT

All sample data is summarized in table form. The tables are titled "Radiological Monitoring Program Annual Summary" and use the following format as specified in the NRC Branch Technical Position:

<u>Column</u>

1 Sample medium.

2 Type and number of analyses performed.

3 Required Lower Limits of Detection (LLD), see Section 3.8, Table 3.8-1. This wording indicates that inclusive data is based on 4.66 s_b (sigma) of background (see Section 3.7).

4 The mean and range of the positive measured values of the indicator locations.

5 The mean, range, and location of the highest indicator annual mean. Location designations are keyed to Table 3.3-1 in Section 3.3.

6 The mean and range of the positive measured values of the control locations.

7 The number of nonroutine reports sent to the Nuclear Regulatory Commission.

NOTE: Only positive measured values are used in statistical calculations.

RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2002

Medium (Units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Non-routine Reports
Surface (Lake) Water (pCi/liter)	H-3 (8) :	3000	297 (1/4) 297 - 297	No. 3 297 (1/4) 0.6 @ 55° 297 - 297	<LLD	0
	GSA (24) :					
	Mn-54	15	<LLD	<LLD	<LLD	0
	Fe-59	30	<LLD	<LLD	<LLD	0
	Co-58	15	<LLD	<LLD	<LLD	0
	Co-60	15	<LLD	<LLD	<LLD	0
	Zn-65	30	<LLD	<LLD	<LLD	0
	Zr-95	15	<LLD	<LLD	<LLD	0
	Nb-95	15	<LLD	<LLD	<LLD	0
	I-131	15	<LLD	<LLD	<LLD	0
	Cs-134	15	<LLD	<LLD	<LLD	0
	Cs-137	18	<LLD	<LLD	<LLD	0
	Ba/La-140	15	<LLD	<LLD	<LLD	0

RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2002

Medium (Units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Non-routine Reports
Shoreline Sediment (pCi/g-dry)	GSA (4) :					
	Cs-134	0.15	<LLD	<LLD	<LLD	0
	Cs-137	0.18	0.049 (2/2) 0.045 - 0.053	No. 5 0.049 (2/2) 1.5 @ 80° 0.045 - .053	<LLD	0
Fish (pCi/g-wet)	GSA (21) :				<LLD	0
	Mn-54	0.13	<LLD	<LLD	<LLD	0
	Fe-59	0.26	<LLD	<LLD	<LLD	0
	Co-58	0.13	<LLD	<LLD	<LLD	0
	Co-60	0.13	<LLD	<LLD	<LLD	0
	Zn-65	0.26	<LLD	<LLD	<LLD	0
	Cs-134	0.13	<LLD	<LLD	<LLD	0
	Cs-137	0.15	0.016 (1/14) 0.016-0.016	No. 2 0.016 (1/7) 0.3 @ 315° 0.016 - 0.016	<LLD	0
					<LLD	0
					<LLD	0

RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2002

Medium (Units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Non-routine Reports
Food Products (pCi/g-wet)	GSA (16) :					
	I-131	0.06	<LLD	<LLD	<LLD	0
	Cs-134	0.06	<LLD	<LLD	<LLD	0
	Cs-137	0.08	<LLD	<LLD	<LLD	0
Milk (f) (pCi/liter)	GSA (108) :					
	Cs-134	15	<LLD	<LLD	<LLD	0
	Cs-137	18	<LLD	<LLD	<LLD	0
	Ba/La-140	15	<LLD	<LLD	<LLD	0
	I-131 (108):	1	<LLD	<LLD	<LLD	0

RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2002

Medium (Units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Non-routine Reports
Air Particulate and Radioiodine (d) (pCi/m^3)	G.B. (260) :	0.01	0.016 (208/208) 0.006 - 0.026	R-1 0.016 (52/52) 1.8 @ 88° 0.007 - 0.026	0.017 (52/52) 0.008 - 0.027	0
	I-131 (260) :	0.07	<LLD	<LLD	<LLD	0
	GSA (60) :					
	Cs-134	0.05	<LLD	<LLD	<LLD	0
	Cs-137	0.06	<LLD	<LLD	<LLD	0
	Co-60	N/A	<LLD	<LLD	<LLD	0
TLD (mrem per standard month)	Gamma Dose (127) :	N/A	4.8 (119/119) (c) 3.1 - 9.4	No. 85 8.6 (4/4) (e) 0.2 @ 294° 7.0 - 9.4	4.1 (8/8) 3.4 - 5.2	

ANNUAL SUMMARY TABLE NOTES

*****	**=**	**Data for the Annual Summary Tables is based on RETS required samples only.**
N/A	**=**	**Not applicable.**
(a)	**=**	**Fraction of detectable measurement to total measurement.**
(b)	**=**	**Location is distance in miles, and direction in compass degrees. Location numbers keyed to Table 3.3-1 and results table location designation numbers.**
(c)	**=**	**Indicator TLD locations are: #7, 8, 23, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 15, 18, 56, and 58. Control TLDs are all TLDs located beyond the influence of the site (#14, 49).**
(d)	**=**	**Indicator samples from environmental stations R1 off-site, R2 off-site, R3 off-site, and R4 off-site. Control samples are samples from R5 off-site environmental station.**
(e)	**=**	**This dose is not representative of doses to a member of the public since this area is located near the north shoreline which is in close proximity to the generating facility and is not accessible to members of the public (see Section 5.2.4, TLDs).**
(f)	**=**	**The RETS criteria for indicator milk sample locations includes locations within 5.0 miles of the site. There are no milk sample locations within 5.0 miles of the site. Therefore, milk samples are collected from locations greater than 5.0 miles from the site based on the location D/Q values.**

5.0 DATA EVALUATION

A. Introduction

Each year the results of the Annual Radiological Environmental Monitoring Program are evaluated considering plant operations at the site, the natural processes in the environment and the archive of historical environmental radiological data. A number of factors are considered in the course of evaluating and interpreting the Annual Environmental Radiological Data. This interpretation can be made using several methods including trend analysis, population dose estimates, risk estimates to the general population based on significance of environmental concentrations, effectiveness of plant effluent controls and specific research areas. The report not only presents the data collected during the 2002 sample program but also assesses the significance of radionuclides detected in the environment. It is important to note that detection of a radionuclide is not, of itself, an indication of environmental significance. Evaluation of the impact of the radionuclide in terms of potential increased dose to man, in relation to natural background, is necessary to determine the true significance of any detection.

B. Units of Measure

Some of the units of measure used in this report are explained below.

Radioactivity is the number of atoms in a material that decay per unit of time. Each time an atom decays, radiation is emitted. The *curie* (Ci) is the unit used to describe the activity of a material and indicates the rate at which the atoms are decaying. One curie of activity indicates the decay of 37 billion atoms per second.

Smaller units of the curie are used in this report. Two common units are the *microcurie* (uCi), one millionth (0.000001) of a curie, and the *picocurie* (pCi), one trillionth (0.000000000001) of a curie. The picocurie is the unit of radiation that is routinely used in this report. The mass, or weight, of radioactive material, that would result in one curie of activity depends on the disintegration rate or half life. For example, one gram of radium-226 contains one curie of activity, but it would require about 1.5 million grams of natural uranium to equal one curie. Radium-226 is more radioactive than natural uranium on a weight or mass basis.

C. Dose/Dose to Man

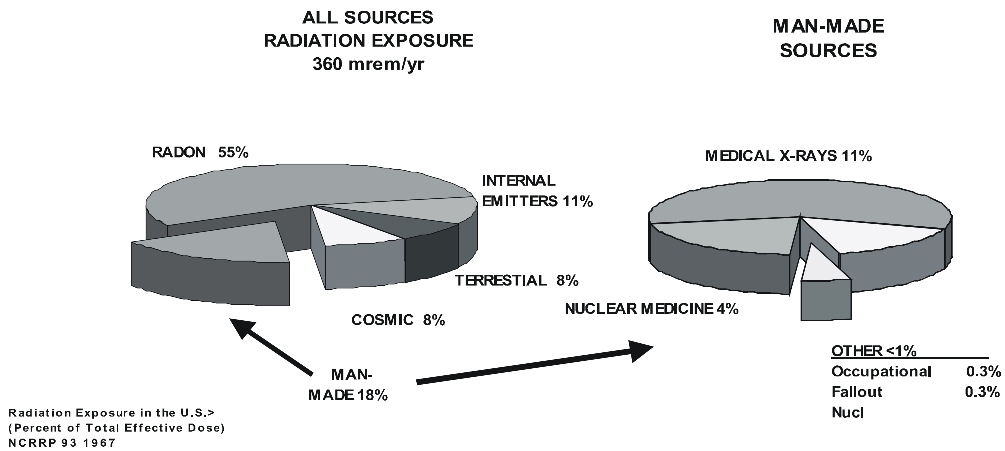
The dose or dose equivalent, simply put, is the amount of ionizing energy deposited or absorbed in living tissue. The amount of energy deposited or ionization caused is dependent on the type of radiation. For example, alpha radiation can cause dense localized ionization that can be up to 20 times the amount of ionization for the same energy imparted as from gamma or x-rays. Therefore, a quality factor must be applied to account for the different ionizing capabilities of various types of radiation. When the quality factor is multiplied by the absorbed dose, the result is the dose equivalent which is an estimate of the possible biological damage resulting from exposure to any type of ionizing radiation. The dose equivalent is measured in rem (roentgen equivalent man). In terms of environmental radiation, the rem is a large unit. Therefore, a smaller unit, the millirem (mrem) is often used. One millirem is equal to 0.001 of a rem.

The term “dose to man” refers to the dose or dose equivalent that is received by members of the general public at or beyond the site boundary. The dose is calculated based on measured concentrations of radioactive material measured in the environment. The primary pathways that contribute to the dose to man are the inhalation pathway, the ingestion pathway and direct radiation.

D. Discussion

There are three separate groups of radionuclides that were measured in the environment in the media analyzed for the 2002 sampling program. The first of these groups consists of those radionuclides that are naturally occurring. The environment contains a significant inventory of naturally occurring radioactive elements. The components of natural or background radiation include the decay of radioactive elements in the earth’s crust, a steady stream of high-energy particles from space called cosmic radiation, naturally-occurring radioactive isotopes in the human body like potassium-40, medical procedures, man-made phosphate fertilizers (phosphates and uranium are often found together in nature), and even household items like televisions. In the United States, a person’s average annual exposure from background radiation is 360 mrem, as illustrated on the following Background Radiation Chart.

Background Radiation



impact is demonstrated by the Radiological Environmental Monitoring Program (REMP) results.

The second group of radionuclides that were detected are a result of the detonation of thermonuclear devices in the earth's atmosphere. Atmospheric nuclear testing during the early 1950s produced a measurable inventory of radionuclides presently found in the lower atmosphere as well as in ecological systems. In 1963 an Atmospheric Test Ban Treaty was signed. Since the treaty, the global inventory of man made radioactivity in the environment has been greatly reduced through the decay of short lived radionuclides and the removal of radionuclides from the food chain by such natural processes as weathering and sedimentation. This process is referred to in this report as ecological cycling. Since 1963, several atmospheric weapons tests have been conducted by the People's Republic of China. In each case, the usual radionuclides associated with nuclear detonations were detected for several months following the test and then after a peak detection period diminished to a point where most could not be detected. Although reduced in frequency, atmospheric testing continued into the 1980's. The resulting fallout or deposition from these most recent tests has influenced the background radiation in the vicinity of the site and was evident in many of the sample media analyzed over the years. The highest weapons testing concentrations were noted in samples collected for the 1981 Environmental Surveillance Program. Cs-137 was the major byproduct of this testing and is still detected in a number of environmental media.

The third group of radionuclides that may be detected in the environment are those that are related to nuclear power technology. These radionuclides are the byproduct of the operation of light water reactors. These byproduct radionuclides are the same as those produced in atmospheric weapons testing and found in the Chernobyl fallout. This commonality makes an evaluation of the source of these radionuclides that may be detected in environmental samples difficult to determine. During 2002, H-3 and Cs-137 were potentially plant-related radionuclides detected in the REMP samples.

A number of factors must be considered in performing radiological sample data evaluation and interpretation. The evaluation is made using several approaches including trend analysis and dose to man. An attempt has been made not only to report the data collected during 2002, but also to assess the significance of the radionuclides detected in the environment as compared to natural and other manmade radiation sources. It is important to note that detected concentrations of radionuclides in the local environment as a result of mans technology are very small and are of no or little significance from an environmental or dose to man perspective.

The 1987 per capita dose was determined to be 360 mrem per year from all sources, as noted in NCRP Report No. 93 (Reference 16). This average dose includes such exposure sources as natural radiation, occupational exposure, weapons testing, consumer products and nuclear medicine. The 1987 per capita dose rate due to natural sources was 295 mrem per year. The per capita radiation dose from nuclear power production nation wide is less than one mrem per year (Reference 10).

The natural background gamma radiation in the environs of the Nine Mile Point Site, resulting from radionuclides in the atmosphere and in the ground, accounts for approximately 60-65 mrem per year. This dose is a result of radionuclides of cosmic origin (for example, Be-7) and of primordial origin (Ra-226, K-40, and Th-232). A dose of 60 mrem per year, as a background dose, is significantly greater than any possible doses as a result of routine operations at the site during 2002.

The results of each sample medium are discussed in detail in Section 5.0. This includes a summary of the results, the estimated environmental impact, a detailed review of any relevant detections with a dose to man estimate where appropriate, and an analysis of possible long term and short term trends.

In the routine implementation of the Radiological Environmental Monitoring Program, additional or optional environmental pathway media are sampled and analyzed. These samples are obtained to:

- Expand the area covered by the program beyond that required by the operating license,

- Provide more comprehensive monitoring than is currently required,

- Monitor the secondary dose to main pathways, and

- Maintain the analytical data base established in 1975 when the plant began commercial operation.

These additional samples may include: aquatic vegetation (cladophora), bottom sediment, mollusk, milk (Sr-90), meat, poultry and soil samples. The optional samples that are collected will vary from year to year. In addition to the optional sample media, additional locations are sampled and analyzed for those pathways required by TS/ODCM. These additional sample locations are obtained to ensure that a variety of environmental pathways are monitored in a comprehensive manner. Data from additional sample locations that are associated with the required TS/ODCM sample media are included in the data presentation and evaluation. When additional locations are included, the use of this data is specifically noted in Section 5.0.

Section 6.0 contains the analytical results for the sample media addressed in the report. Tables are provided for each required sample medium analyzed during the 2002 program.

Section 7.0, titled Historical Data, contains statistics from previous years environmental sampling. The process of determining the impact of plant operation on the environment includes the evaluation of past analytical data, to determine if trends are changing or developing. As state-of the art detection capabilities improve, data comparison is difficult in some cases. For example, Lower Limits of Detections (LLDs) have improved significantly since 1969 due to technological advances in laboratory procedures and analytical equipment.

5.1 AQUATIC PROGRAM

The aquatic program consists of samples collected from three environmental pathways. These pathways are:

- Shoreline Sediment
- Fish
- Surface Waters

Section 6.0, Tables 6.1 through 6.4 represent the analytical results for the aquatic samples collected for the 2002 sampling period.

5.1.1 SHORELINE SEDIMENT RESULTS

A. Results Summary

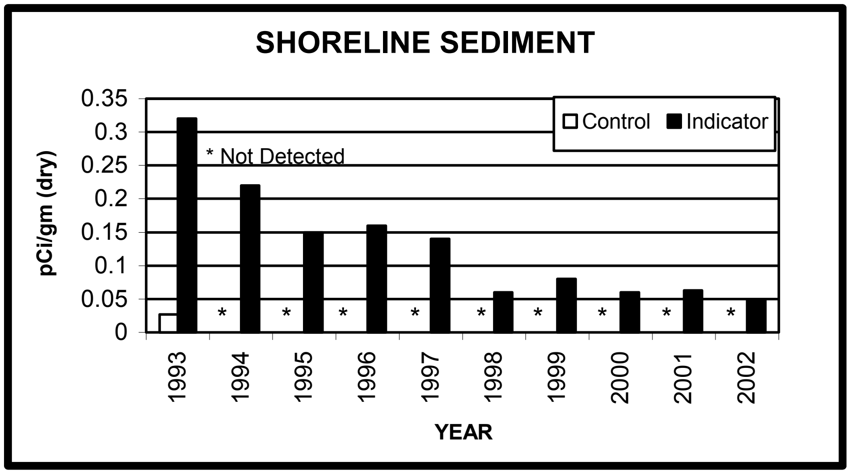
Shoreline sediment samples were obtained in April and October of 2002 at one off-site control location (near Oswego Harbor) and at one indicator location which is an area east of the site considered to have recreational value.

A total of four sediment samples were collected for the 2002 sample program, two indicator and two control. Cs-137 was detected in both samples collected from the Sunset Bay indicator location in 2002 and ranged from a minimum of 0.045 pCi/g (dry) to a maximum of 0.053 pCi/g (dry). Cs-137 was not detected in samples collected from the control location during 2002; however, Cs-137 has been detected in past control samples. Cs-137 was detected in control samples collected in 1993 at an average concentration of 0.027 pCi/g.

The general lack of Cs-137 at the control location is attributed to the differences in the sediment types between the two sample locations (See Data Evaluation and Discussion). The source of the Cs-137 detected in the indicator shoreline sediment is considered to be the result of fallout from atmospheric nuclear weapons testing and not from operations at the site. The mean concentration of Cs-137 measured in the 2002 indicator samples, is the lowest measured concentrations since sampling began in 1985. Historical mean concentrations measured at the indicator location ranged from a maximum of 0.32 pCi/g in 1993 to a minimum value of 0.05 pCi/g (dry) in 2002. The results for the 2002 control location were less than the detection limit. No other plant related radionuclides were detected in the 2002 shoreline sediment samples.

The calculated potential whole body and skin doses which may result from the measured Cs-137 concentrations are extremely small and are insignificant when compared to natural background doses.

The following is a graph of the average Cs-137 concentration in shoreline sediment samples over the previous nine years. This graph illustrates a general downward trend in the Cs-137 concentrations since 1993.



B. Data Evaluation and Discussion

Shoreline sediment samples are routinely collected twice per year from the shoreline of Lake Ontario. Samples are collected from one indicator location (Sunset Bay), and one control location (Lang's Beach). Samples were collected from both the indicator and control location in April and October 2002. The results of these sample collections are presented in Section 6.0, Table 6-1, "Concentrations of Gamma Emitters in Shoreline Sediment Samples -2002". Cesium-137 (Cs-137) and Potassium-40 (K-40) were the significant radionuclides detected in the sediment samples.

Cs-137 was detected in both April and October indicator samples collected for the 2002 program. The measured concentrations for these samples were 0.053 pCi/g (dry) and 0.045 pCi/g (dry). The presence of Cs-137 in certain environmental sample media such as soil, shoreline sediment and fish is common. Cs-137 is a fission product that is produced in power reactors and during atmospheric weapons testing. In addition to the Cs-137 found in the environment as a result of past weapons testing, a significant inventory of Cs-137 was also introduced globally as a result of the Chernobyl accident in 1986. Because Cs-137 is found in environmental samples as a result of weapons testing and Chernobyl, it is difficult to accurately determine the source of Cs-137 measured in the sediment sample. It is highly probable that the source of the cesium is from sources other than the operation of plants at the Nine Mile Point Site. It is likely that any sediment sample containing Cs-137 concentration which were the result of plant operation would also contain other plant related isotopes such as Co-60 and Cs-134. The absence of corroborating isotopes would indicate that the source of Cs-137 in sediment samples is from the existing background Cs-137 which is attributed to weapons testing and the Chernobyl accident. This assessment is further substantiated by the fact that Cs-137 was detected in the 1993 sediment control sample. Cs-137 has been routinely measured in the control samples of other environmental media such as fish and soil.

The general absence of Cs-137 in the control samples is attributed to the differences in the sediment types between the two sample locations. Few shoreline regions west of the site contain fine sediment and/or sand which would be representative of the indicator location. It is difficult to obtain control samples, which are comparable in physical and chemical characteristics to the indicator samples. Other factors, which include changing lake level and shoreline erosion, further complicate attempts at consistency in shoreline sediment sampling. Recent soil samples from locations beyond any expected influence from the site have contained levels of Cs-137 equal to or greater than the concentrations found in 2002 shoreline sediment. The Cs-137 is commonly found in soil samples and is attributed to weapons testing fallout. Shoreline samples containing soil or sediment are likely to contain Cs-137.

C. Dose Evaluation

The radiological impact of Cs-137 measured in the shoreline sediment can be evaluated on the basis of dose to man. In the case of shoreline sediments, the critical pathway is direct radiation to the whole body and skin. Using the parameters provided in Regulatory Guide 1.109, the potential dose to man in mrem per year can be calculated. The following regulatory guide values were used in calculating the dose to man:

- A teenager spends 67 hours per year at the beach area or on the shoreline,
- The sediment has a mass of 40 kg/m^2 (dry) to a depth of 2.5 cm,
- The shoreline width factor is 0.3, and
- The maximum measured Cs-137 concentration of 0.053 pCi/g (dry)

Using these conservative parameters, the potential dose to the maximum exposed individual (teenager) would be 0.00018 mrem/year to the whole body and 0.00021 mrem/year to the skin. This calculated dose is very small and is insignificant when compared to the natural background annual exposure of approximately 60 mrem.

D. Data Trends

The mean Cs-137 concentration for the shoreline sediment indicator samples for 2002 was 0.05 pCi/g (dry), which is the lowest mean concentration measured since sampling was initiated in 1985. Indicator samples collected in 1985 through 1988 contained no measureable concentrations of Cs-137. The mean indicator values for the previous ten years (1992 – 2001) ranged from 0.32 pCi/g (dry) in 1993 to 0.06 pCi/g (dry) in 1998 and 2000. The mean indicator results for the previous five year period ranged from 0.14 pCi/g (dry) in 1997 to 0.06 pCi/g (dry) in 1998 and 2000.

Cs-137 was not detected in samples collected from the control location during 2002.

A review of indicator and control sample results for 1985 – 1988 indicate only naturally occurring radionuclides present in shoreline sediment. The period from 1989 – 2002 shows the presence of Cs-137 in the indicator samples. The historical data shows an emergence of Cs-137 concentrations in 1989 which continues through 2002. The trend since 1989 shows a reduction of Cs-137 concentrations over the four year period to the concentration of 0.13 pCi/g (dry) measured in 1992. The 1993 sample showed an increase in Cs-137 concentration to 0.32 pCi/g (dry) followed by a reduction in concentration to 0.24 pCi/g (dry) in 1994 and continued general reductions through 2002 to 0.05 pCi/g (dry). The overall five year trend for Cs-137 concentrations in shoreline sediment is a steady reduction in concentrations from year to year to a low concentration of 0.05 pCi/g (dry) in 2002.

Shoreline sediment sampling at the indicator location commenced in 1985. Prior to 1985, no data were available for long term trend analysis.

Tables 7-1 and 7-2 in Section 7.0 illustrate historical environmental data for shoreline sediment samples.

5.1.2 FISH SAMPLE RESULTS

A. Results Summary

A total of 21 fish samples were collected for the 2002 sample program. Fish species collected included Smallmouth Bass, Brown Trout, Lake Trout, Walleye and Salmon. Analytical results showed 1 sample having a detectable concentration of Cs-137. Cs-137 is a radionuclide related to past weapons testing. No other plant related radionuclides were detected in any of the other fish samples collected in 2002.

Cs-137 was detected in the Walleye indicator with a concentration of 0.016 pCi/g (wet). This concentration is consistent with Cs-137 mean concentrations found in Walleye samples collected over the past 4 years. This concentration of Cs-137 is very low and is below the required Lower Limit of Detection (LLD) of 0.15 pCi/g (wet) for Cs-137 in fish.

The small concentration of Cs-137 detected in the one Walleye indicator sample represents approximately 5% of the total fish samples collected from both the on-site and off-site locations. This percentage is consistent with fish samples collected in 2000 and is lower than the 9% and 11% for fish samples collected and analyzed in 1999 and 1998 respectively. In 1990 43% of all samples collected contained Cs-137 with a mean concentration of 0.044 pCi/g (wet). This represents an overall downward trend in fish Cs-137 concentrations over the last thirteen years. Intermittent detection of Cs-137 in control and indicator samples began in 1996 and was not detected in any fish samples collected for the first time in 2001.

Comparable concentrations of Cs-137 are routinely found in samples of other aquatic media such as shoreline sediment, bottom sediment and aquatic vegetation. The potential whole body and critical organ doses calculated as a result of fish consumption by humans are very small. The dose that could result from the Cs-137 in fish can be considered background exposure because of the sources of the Cs-137.

The fish sample results demonstrate that plant operations at the Nine Mile Point Site have no measurable radiological environmental impact on the upper levels of the Lake Ontario food chain.

B. Data Evaluation and Discussion

Gill nets were used to collect fish from designated indicator and control sample locations. One control location was established in the Oswego Harbor area located greater than five miles from the site, and two indicator locations were established in the vicinity of the Nine Mile Point Nuclear Station (NMPNS) and James A. Fitzpatrick Nuclear Power Plant (JAFNPP) discharges. All samples were analyzed for gamma emitters. Table 6-2 shows individual results for all the samples collected in 2002 in units of pCi/g (wet).

The spring fish collection was made up of 12 individual samples representing 4 separate species. Smallmouth Bass, Brown Trout, Lake Trout and Walleye were collected from all 3 sample locations.

The total fall fish collection was comprised of 9 individual samples representing 3 individual species. Smallmouth Bass, Brown Trout, and Salmon were also collected from all sample locations.

Cs-137 was detected in 1 of the 8 indicator samples collected in the spring from the NMPNS indicator sample at a concentration of 0.016 pCi/g (wet). Cs-137 was not detected in fish species collected from the JAFNPP indicator or control locations for the same sample period or in any of the fish samples collected during the fall sample period.

The Cs-137 indicator concentration was consistent with Cs-137 concentrations detected in 2000 control and 1999 indicator samples. The source of the Cs-137 in fish samples is considered to be the existing Cs-137 background concentration in the environment from weapons testing and Chernobyl.

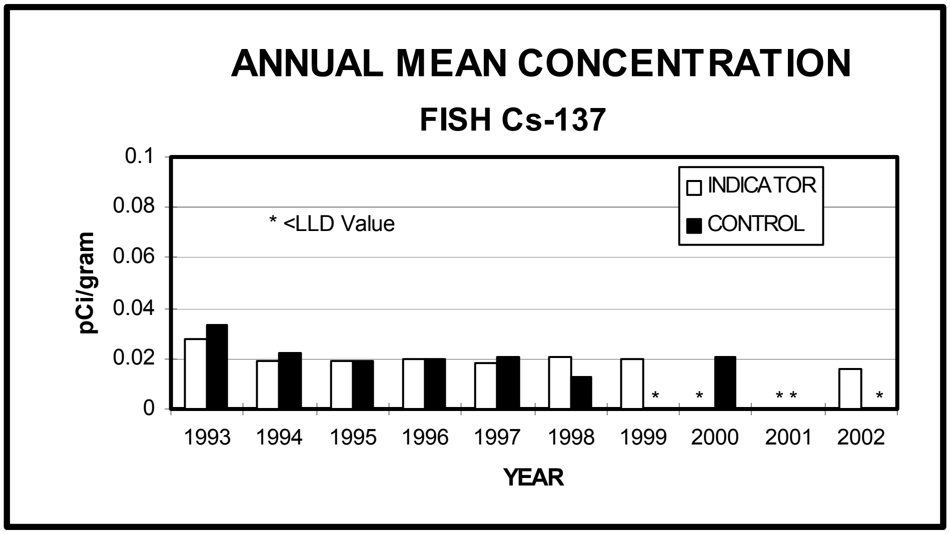
C. Dose Evaluation

Some Lake Ontario fish species may be considered an important food source due to the local sport fishing industry. Therefore, these fish are an integral part of the human food chain. Based on the use of fish in the local diet, a conservative estimate of potential dose to man can be calculated. Assuming that an adult consumes 21 kg and a teen consumes 16 kg of fish per year, (Regulatory Guide 1.109 maximum exposed age group) and the fish consumed contains a Cs-137 concentration of 0.016 pCi/g (wet), the adult whole body dose received would be 0.024 mrem per year. The organ of interest for Cs-137 is the teen liver; which would receive a calculated dose of 0.038 mrem per year. The Cs-137 whole body and organ doses are conservatively estimated doses based on the consumption of fish species from the Nine Mile Point area. Due to the long half-life of Cs-137, no radiological decay is assumed for the calculation of doses.

In summary, the potential whole body and organ doses received as a result of fish consumption are very small. The dose to man that could be received from the indicator sample group is considered to be background exposures. The dose to man from operation of the plants at Nine Mile Point via the fish pathway is of no significance.

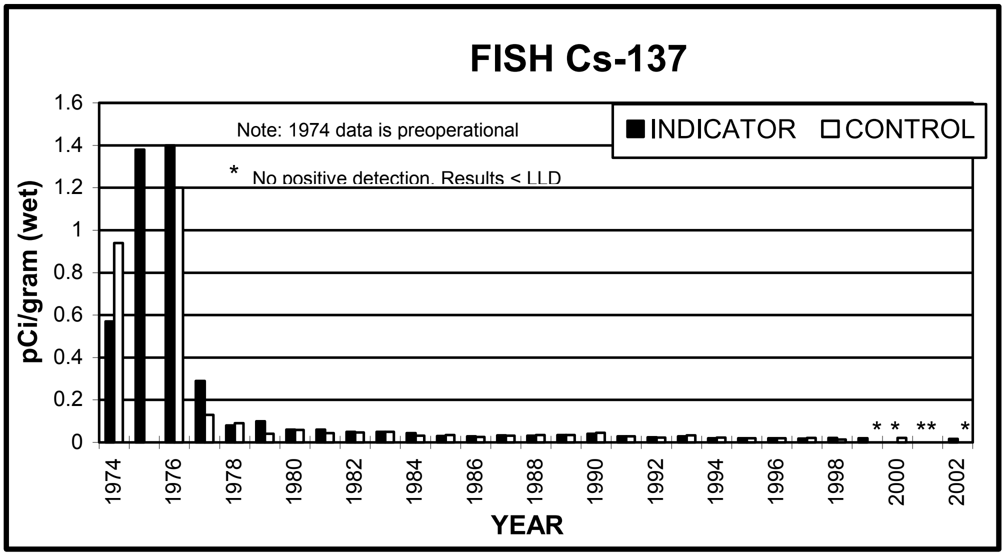
D. Data Trends

Results for the previous five years (1997 through 2001) have shown a steady downward trend of Cs-137 levels in both the control and indicator samples. During the period of 1990 through 1994, control and indicator mean results were on a small downward trend with a small rise in 1993. The 1994 through 2002 results as a group are the lowest Cs-137 concentrations measured since sampling began in 1974. Intermittent detection of Cs-137 in control and indicator samples began in 1999 and was not detected in any fish samples collected for the first time in 2001. The graph below illustrates the mean Cs-137 concentration for indicator and control samples collected over the past 10 years.



The long term trend shows that mean concentrations of Cs-137 for indicator samples has decreased from a maximum mean concentration of 1.4 pCi/g (wet) in 1976 to a minimum mean concentration of 0.018 pCi/g (wet) in 1997. The decreasing trend continued throughout 2002 with intermittent detections beginning in 2000. Control sample Cs-137 results have also decreased from a maximum mean concentration of 1.2 pCi/g (wet) in 1976 to intermittent detections beginning in 1999. Fish results for the 2002 indicator sample shows a decrease in concentration by a factor of approximately 87 compared to 1976. Control results have shown a similar reduction.

The general long term decreasing trend for Cs-137 concentrations found in fish, illustrated in the graph below, is most probably a result of the cesium becoming unavailable to the ecosystem due to ion exchange with soils and sediments and radiological decay. The concentrations of Cs-137 detected in fish since 1976 are a result of weapons testing fallout. The general downward trend in concentrations will continue as a function of additional ecological cycling and nuclear decay.



Additionally, a significant downward trend in the percentage of fish samples having detectable levels of Cs-137.

Tables 7-3 and 7-4 in Section 7.0 show historical environmental sample data for fish.

5.1.3 SURFACE WATER (LAKE)

A. Results Summary

The TS/ODCM require that monthly surface water samples be taken from the respective inlet water supply of the James A. FitzPatrick N.P.P. and NRG Energy's Oswego Steam Station. In conjunction with the required samples, three additional Lake Ontario surface water locations are sampled and analyzed. These additional locations are the Oswego City Water Intake, the NMP Unit #1 Intake and the NMP Unit #2, Intake. Gamma spectral analysis was performed on 24 monthly composite samples from the TS/ODCM locations and on 36 monthly composite samples from the additional sample locations. The results of the gamma spectral analysis show that only naturally occurring radionuclides were detected in the 60 samples collected from the five locations for the 2002 Sampling Program. The two naturally occurring radionuclides detected were K-40 and Ra-226 and are not related to operations of the plant. Monthly composite samples show no presence of plant related gamma emitting isotopes in the waters of Lake Ontario as a result of the operation of the plant.

The monthly surface water samples are composited on a quarterly basis and are analyzed for tritium. A total of 20 samples were analyzed for tritium as part of the 2002 REMP program. The results for the 2002 samples showed two positive detections of tritium and the remaining 18 results were below the established measurement sensitivity and are reported as less than the lower limit of detection (<LLD). The two positive detections were very near the measurement threshold and were detected in the FitzPatrick second quarter inlet sample and the Oswego City Water second quarter inlet sample. The FitzPatrick sample had a measured concentration of 297±85 pCi/l and is designated as an indicator sample. The Oswego City Water inlet sample is considered to be representative of a control sample and contained a similar concentration of 268±83 pCi/l. Both of these sample results are near the established detection limit and are consistent with historical levels of tritium measured in lake Ontario control samples. Tritium is found in the environment at low concentrations as a result of natural production from cosmic ray interaction in the upper atmosphere and from past weapons testing. The measured concentrations of these samples are within the normal historical variation for naturally occurring tritium levels in surface water. There is no indication of a long-term buildup of tritium concentrations in the surface water adjacent to the site.

B. Data Evaluation and Discussion

Gamma spectral analysis was performed on monthly composite samples from five Lake Ontario sampling locations. No plant related radionuclides were detected in the 2002 samples. This is consistent with historical data, which has not shown the presence of plant related radionuclides in surface water samples.

Tritium samples are quarterly samples that are a composite of the appropriate monthly samples. Tritium results for the James A. FitzPatrick inlet canal samples had one positive detection of 297±85, and the remaining results had a LLD that ranged from <270 pCi/l to <290 pCi/l. The TS/ODCM control location (Oswego Steam Station inlet canal) results showed no positive detections and the sample results had an LLD range of <260 pCi/l to <280 pCi/l.

Tritium was detected in one of the twelve optional Lake Ontario samples collected in the 2002 program. The second quarter Oswego City Water inlet sample showed a measured concentration of 268±83 pCi/l. The Oswego City

Water inlet is sampled to monitor drinking water quality and is representative of a control location due to its distance from the site. The city water inlet is located 7.8 miles west of the site in an "up-stream" direction based on the current patterns in the lake. The two measured concentrations of tritium in the 2002 sample program are well within the expected range for tritium surface water and are within the bounds for control location concentrations measured over the past fifteen years. The remaining three sample locations showed no measurable concentrations of tritium in the samples collected for the 2002 sample program.

A summary of tritium results for the 2002 sample program is listed below:

Sample Location	Tritium Concentration pCi/liter Minimum	Maximum	Mean (Annual)
JAF Inlet (Indicator)*	<270	297±85	297±85**
Oswego Steam Inlet (Control)*	<260	<280	<270
NMP #1 Inlet	<270	<290	<275
NMP #2 Inlet	<270	<290	<275
Oswego City Water Supply	<260	268±83	268±83**

* TS/ODCM required
** Only one detection

C. Dose Evaluation

The measured concentration of tritium in the FitzPatrick inlet sample is consistent with offsite or control concentrations based on historical control location results. The radiological impact to members of the public from low levels of tritium in water is insignificant. This can be illustrated by calculating a dose to the whole body and maximum organ using Regulatory Guide 1.109 methodology. Based on a water ingestion rate of 510 liters/yr and the maximum measured concentration of 297 pCi/l. The calculated dose would be 0.031 mrem to the child whole body and 0.031 mrem to the child liver (critical age group/organ).

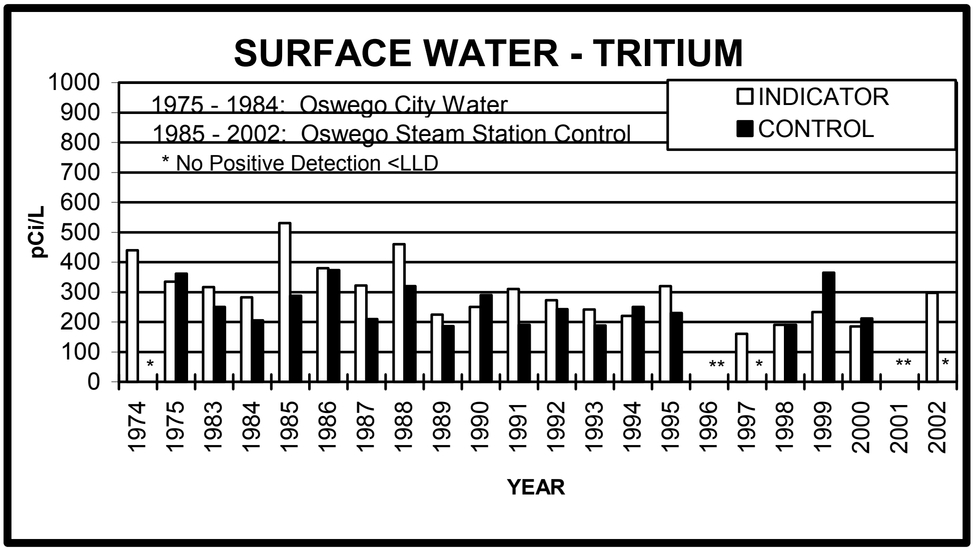
The drinking water sample is from the Oswego City water intake, which is drawn from Lake Ontario at a location more distant from the site than the control location. The maximum potential dose from the use of Oswego City water can be calculated using the LLD concentration calculated for the city water supply. The calculated dose from tritium at this location, using the LLD concentration of <268 pCi/l, would be 0.03 mrem to the child whole body and 0.03 mrem to the child liver. Doses, calculated from the 2002 sample results, are considered background doses and are negligible compared to the 300 mrem annual dose considered to be the overall background annual dose from all sources.

D. Data Trends

There are no data trends for gamma emitters such as Cs-137 and Co-60 as historically these radionuclides have not been detected in lake water samples.

Tritium results for the 2002 lake water samples were consistent with results from the previous five years for both the indicator and control locations. During the previous five year period the maximum mean indicator and control concentrations were measured in 1999. The mean measured tritium concentrations for the previous five year period of 1997 - 2001 ranged from 190 pCi/l to 365 pCi/l for the control and 160 pCi/l to 233 pCi/l for the indicator locations. By comparison, the mean 2002 tritium concentrations were <268 pCi/l for the control and 297 pCi/l for the indicator location. The previous five year data indicates no significant trends in either the indicator or the control mean concentrations. This previous five year data set is consistent with long term tritium results measured at the site. The indicator data from the previous ten year period, 1992 through 2001, is representative of natural variations in environmental tritium concentrations with no significant levels of tritium measured. The 1999 mean control value of 365 pCi/l is the highest concentration measured since 1986 but is within the variability of results measured over the life of the program. The ten year historical results are consistent between the control and indicator locations with no large variation in the measured results.

The following graph illustrates the concentrations of tritium measured in Lake Ontario over the past 28 years at both an indicator and control location. Prior to 1985, the Oswego, City Water Supply results are used as control location data as this location closely approximates the Oswego Steam Station, the current control location.



Historical data for Surface Water Tritium is presented in Section 7.0, Tables 7-7 and 7-8.

5.2 TERRESTRIAL PROGRAM

The terrestrial program consists of samples collected from four environmental pathways. These pathways are:

- Airborne particulate and radioiodine,
- Direct Radiation,
- Milk, and
- Food Products

Tables 6-5 through 6-12 represent the analytical results for the terrestrial samples collected for the 2002 reporting period.

5.2.1 AIR PARTICULATE GROSS BETA

A. Results Summary

Weekly, air samples were collected and analyzed for particulate gross beta particulate activity. For the 2002 program, a total of 52 samples were collected from control location R-5 and 208 samples were collected from indicator locations R-1, R-2, R-3, and R-4. These five locations are required by the TS/ODCM. Additional air sampling locations are maintained and are discussed in Section 5.2.1.B below. The mean gross beta concentration for samples collected from the control location (R-5) in 2002 was 0.017 pCi/m^3. The mean gross beta concentration for the samples collected from the indicator locations (R-1, R-2, R-3, and R-4) in 2002 was 0.016 pCi/m^3. The consistency between the indicator and control means demonstrates that there are no increased airborne radioactivity level in the general vicinity of the site. The indicator results are consistent with concentrations measured over the last fourteen years. This consistency demonstrates that the natural baseline gross beta activity has been reached. The manmade radionuclide contribution to the natural background from atmospheric weapons testing and Chernobyl can no longer be detected above the background concentrations of naturally occurring beta emitting radionuclides.

B. Data Evaluation and Discussion

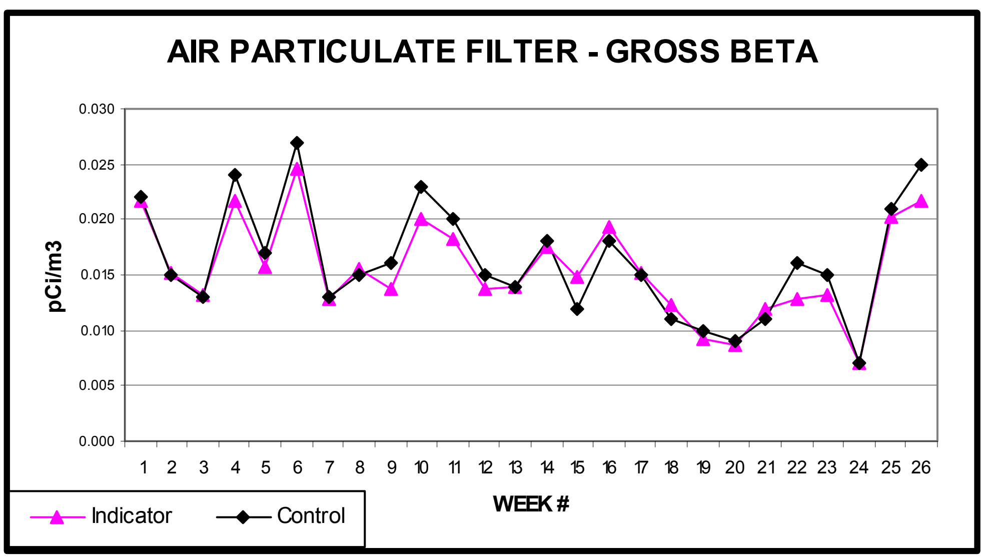
The air monitoring system consists of fifteen sample locations, six on-site and nine off-site. Each location is sampled weekly for particulate gross beta acitivity. A total of 780 samples were collected and analyzed as part of the 2002 program. Five of the nine off-site locations are required by TS/ODCM. These locations are designated as R-1, R-2, R-3, R-4, and R-5. R-5 is a control location required by the TS/ODCM and is located beyond any local influence from the site. In addition, optional off-site and on-site air sample locations are maintained from which weekly samples are collected. The optional off-site locations are designated as D-2, E, F and G. The optional on-site locations are designated as D-1, G, H, I, J and K.

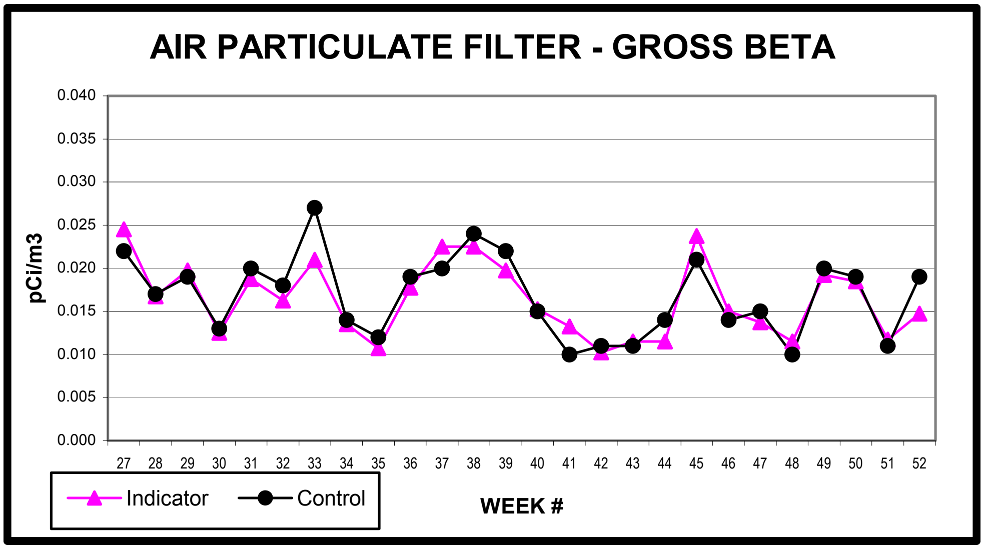
Gross beta analysis requires that the samples be counted no sooner than 24 hours after collection. This allows for the decay of short half-life naturally occurring radionuclides, thereby increasing the sensitivity of the analysis for plant related radionuclides. Tables 6-5 and 6-6 in Section 6.0 present the weekly gross beta activity results for samples collected from the off-site and on-site locations.

The average annual gross beta indicator concentrations for the TS/ODCM indicator stations (R-1, R-2, R-3 and R-4) was 0.016 pCi/m^3. The off-site TS/ODCM control station (R-5) annual mean gross beta concentration was 0.017 pCi/m^3. The minimum, maximum and average gross beta results for sample locations required by TS/ODCM were:

	Concentration pCi/m^3		
Location	Minimum	Maximum	Mean
R-1	0.007	0.026	0.017
R-2	0.006	0.025	0.016
R-3	0.007	0.025	0.016
R-4	0.007	0.025	0.016
R-5	0.008	0.027	0.016

The mean weekly gross beta concentrations measured in 2002 are illustrated in the graphs below.





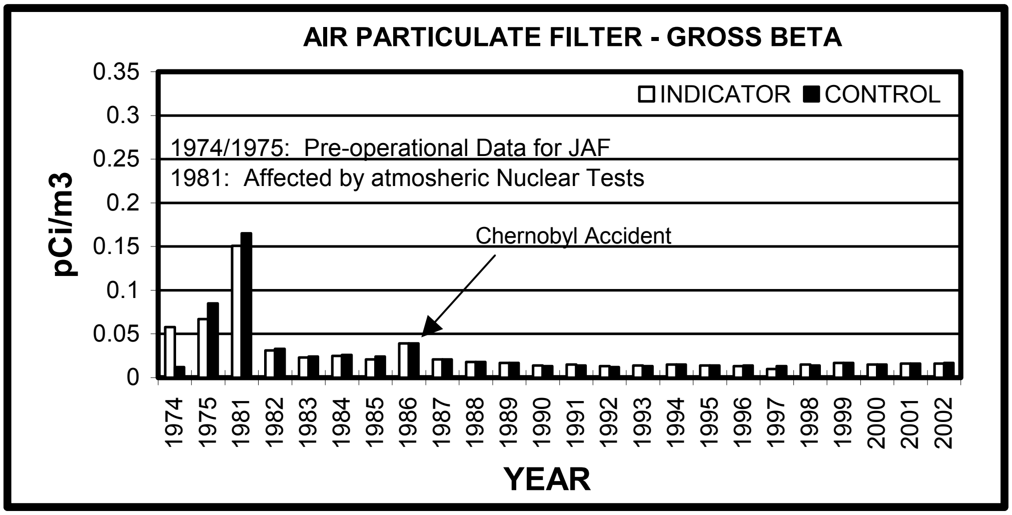
The fluctuations observed in the gross beta activity over the year can be attributed to changes in the environment, especially seasonal changes. The concentrations of naturally occurring radionuclides in the lower levels of the atmosphere directly above the land are affected by time related processes such as wind direction, precipitation, snow cover, soil temperature and soil moisture content.

C. Dose Evaluation

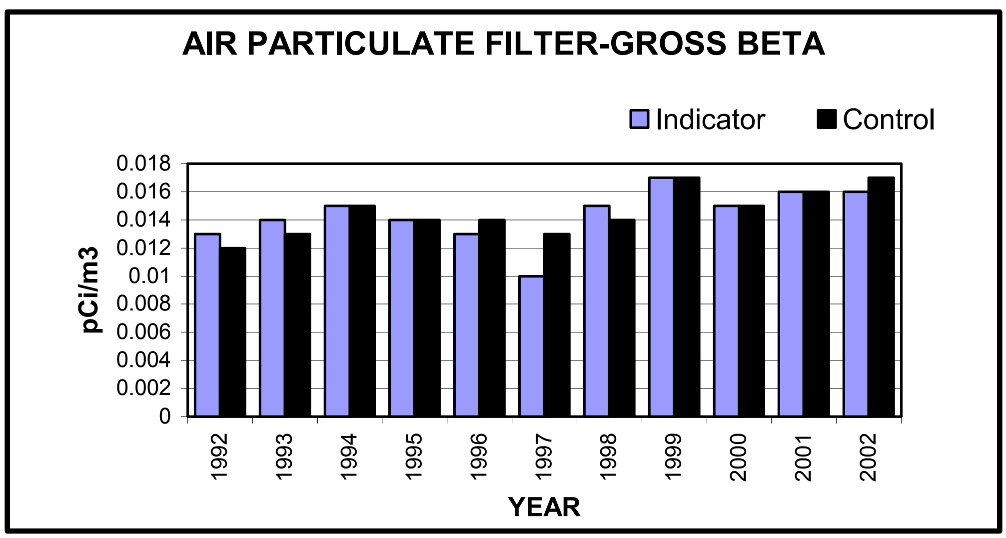
Dose calculations are not performed based on gross beta concentrations. Dose to man as a result of radioactivity in air is calculated using the specific radionuclide and the associated dose factor. See Section 5.2.2.C for dose calculations from air concentrations. The dose received by man from air gross beta concentration is a component of the natural background.

D. Data Trends

With the exception of the 1986 sample data, which was affected by the Chernobyl accident, the general trend in air particulate gross beta activity has been one of decreasing activity since 1981, when the mean control value was 0.165 pCi/m^3. The 1981 samples were affected by fallout from a Chinese atmospheric nuclear test which was detonated in 1980.



The trend for the previous five years represents a base line concentration or natural background level for gross beta concentrations. This trend is stable with minor fluctuations due to natural variations. The change in concentrations over the period of 1992 through 2002 is very small. This is illustrated by the following graph.



For the operational period of 1992 – 2002, the mean annual gross beta concentration at the control station (R-5) has remained steady with a narrow range of 0.012 pci/m^3 to 0.017 pCi/m^3. The mean annual concentrations for the indicator stations for this same time period was similar to the control and ranged from a maximum mean of 0.017 pCi/m^3 in 1999 to a minimum mean of

0.010 pCi/m^3 in 1997. The 2002 gross beta results are consistent with previous results over this 10 year period.

Historical data of air particulate gross beta activity are presented in Section 7.0, Tables 7-9 and 7-10.

5.2.2 MONTHLY PARTICULATE COMPOSITES (GAMMA EMITTERS)

A. Results Summary

Fifteen air monitoring stations are maintained around the Nine Mile Point Site. Five of the 15 air monitoring stations are required by TS/ODCM and are located off-site near the Site Boundary and off-site as a control location. Ten additional air sampling stations are also maintained as part of the sampling program. Together, these fifteen continuous air sampling stations make up a comprehensive environmental monitoring network for measuring radioactive air particulate concentrations in the environs of the site. Annually, the air monitoring stations provide 780 individual air particulate samples which are assembled by location into 180 monthly composite samples. The monthly composites are analyzed using gamma spectroscopy.

No plant related gamma emitting radionuclides were detected in any of the air particulate filter samples collected during 2002.

The gamma analysis results for the monthly composite samples routinely showed positive detections of Be-7, K-40, and Ra-226. Each of these radionuclides is naturally occurring.

B. Data Evaluation Discussion

A Total of fifteen continuous air sampling stations are in contant operation and located both on-site and in the off-site sectors surrounding the Nine Mile Point Site. Five of the fifteen monitoring stations are required by the TS/ODCM and the remaining ten are optional to provide an effective monitoring network. Composite air filter samples are assembled for each of the fifteen sampling locations. Each of the four weekly air particulate samples for the month are assembled by location to form monthly composite samples. The monthly composite samples required by TS/ODCM are composite samples assembled for R-1, R-2, R-3, R-4 and R-5. Other sample locations not required by the TS/ODCM for which analytical results have been provided include six onsite locations and four off-site locations. The analytical results for the 180 air particulate filter composites in 2002 showed no detectable activity of plant related radionuclides.

The results of the monthly composite samples are presented in Section 6.0, Table 6-9.

C. Dose Evaluation

The calculated dose as a result of plant effluents is not evaluated due to the fact no plant related radionuclides were detected in 2002. The monthly air particulate sampling program demonstrated no off-site dose to man from this pathway as a result of operations of the plants located at the Nine Mile Point Site.

D. Data Trends

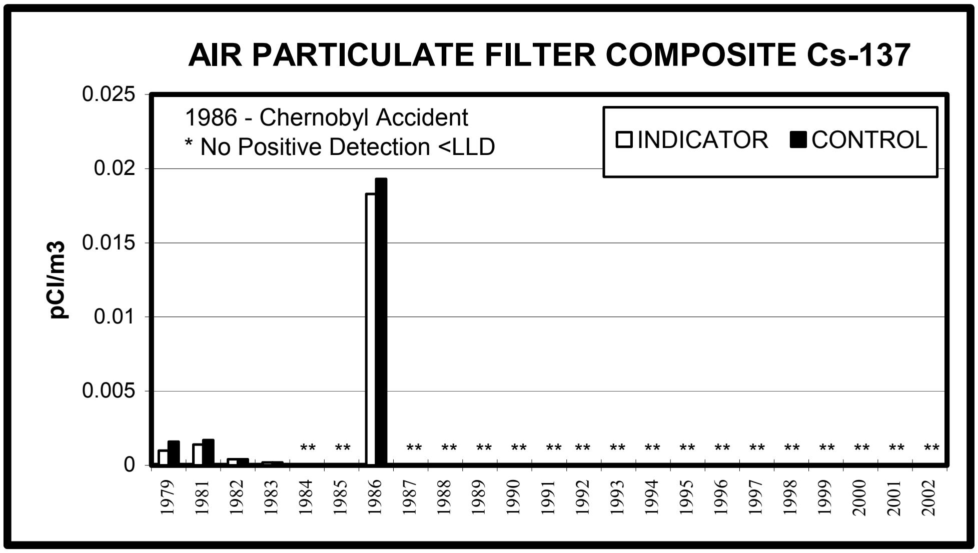
No plant related radionuclides were detected during 2002 at the off-site air monitoring locations.

The five year database of air particulate composite analysis shows that there is no buildup or routine presence of plant related radionuclides in particulate form in the atmosphere around the site. Historically Co-60 was detected in each of the years from 1977 through 1984 at both the indicator and control locations, with the exception of 1980 when Co-60 was not detected at the control location.

The presence of Co-60 in the air samples collected during these years was the result of atmospheric weapons testing. The maximum yearly mean concentration detected during this period was in 1977 when the mean for the indicator results was 0.0179 pCi/m^3. The mean Co-60 control value for this same year was 0.0172 pCi/m^3. During the period of 1977 through 1984, the Co-60 in the air particulate samples trended downward to a mean concentration of 0.0008 pCi/m^3 at the control location in 1984. Co-60 was detected in an off-site 2000 indicator sample and was the first positive detectin of Co-60 since 1984. The detection of Co-60 in the one 2000 sample was an isolated event associated with effluents from the Nine Mile Point Unit 1 Facility. There have been no subsequent measurable concentrations of Co-60 in the environment surrounding the Nine Mile Point Site.

Historical data shows that Cs-137 is the fission product radionuclide most frequently detected in the air particulate filter composites. Cs-137 was detected in each of the years from 1977 through 1983 at both the control and indicator sampling locations. The maximum Cs-137 concentrations for this period were measured in 1977 with a mean indicator concentration of 0.0043 pCi/m^3 and the corresponding control concentration of 0.0034 pCi/m^3. After 1977, the Cs-137 concentration showed a reduction by a factor of approximately two and remained constant through 1981. In 1982, a second reduction in Cs-137 concentration was measured followed by a further reduction in concentration in 1983. Cs-137 was not detected in any of the indicator or control air particulate composite samples collected during 1984 and 1985.

For the period, 1986 to 1991, Cs-137 was detected only in 1986 due to the fallout from the Chernobyl accident. The 1986 mean concentration of Cs-137 for samples collected from the control location was 0.0193 pCi/m^3. The mean concentration of Cs-137 for the indicator location was 0.0183 pCi/m^3 for the same sample period. This overall reduction in Cs-137 concentration since 1977 is attributed to nuclear decay and ecological cycling of Cs-137 since it was initially produced as a result of weapons testing. The decrease in air particulate Cs-137 concentrations since 1977 is clearly illustrated in the following graph of historical data.



In addition to Cs-137, a number of other radionuclides were detected in samples collected during 1986. The isotopes Zr-95, Ce-141, Nb-95, I-131, Ce-144, Mn-54, Ru-103, Ru-106 and Ba-140 were all detected in air particulate composite samples as a result of the fallout from the Chernobyl accident. After 1986, no plant related or fallout radionuclides were detected in any of the off-site air particulate composite samples with the exception of the isolated detection of Co-60 in 2000 in a single sample. A review of the past five year's data for air particulate filter composites indicates no plant related radiological impact on the environment. All previous historical positive detections of fission product radionuclides were associated with atmospheric weapons testing or the Chernobyl accident, with the exception of the 2000 detection noted above.

Historical data for air particulate results are presented in Section 7.0, Tables 7-11 and 7-12.

5.2.3 AIRBORNE RADIOIODINE (I-131)

A. Results Summary

Iodine-131 (I-131) was not detected in any of the 780 samples analyzed for the 2002 program. No radioiodine has been measured off-site at the constant air monitoring stations since 1987.

B. Data Evaluation and Discussion

Airborne radioiodine is monitored at the fifteen air sampling stations also used to collect air particulate samples. There are nine off-site locations, five of which are required by TS/ODCM. The off-site locations required by TS/ODCM are designated as R-1, R-2, R-3, R-4 and R-5. R-5 is a control station located beyond any local influence from the plant. Ten air sampling locations are also maintained in addition to those required by TS/ODCM. Six of these stations D-1, G, H, I, J and K are located onsite. D-2, E, F and G are the optional stations located off-site.

Samples are collected using activated charcoal cartridges. They are analyzed weekly for I-131. No Iodine-131 was detected in any of the 2002 samples collected.

The analytical data for radioiodine are presented in Section 6.0, Tables 6-7 and 6-8.

C. Dose Evaluation

The calculated dose as a result of I-131 was not evaluated due to the fact no I-131 was detected during 2002. The I-131 sampling program demonstrated no off-site dose to man from this pathway as a result of operation of the plants located at Nine Mile Point.

D. Data Trends

No radioiodine has been detected in samples collected from the air sampling locations required by TS/ODCM since 1987.

There has been no positive detection of I-131 in air samples collected over the last ten years. This demonstrates that there is no measurable environmental impact or positive trend for iodine buildup due to plant operations during the period from 1991 through 2002. I-131 has previously been detected in samples collected during the last fifteen year period in 1986 and 1987. The 1986 detection of I-131 was the result of the Chernobyl accident and the 1987 detection was the result of plant operations.

Iodine-131 has been detected in the past at control locations. Control samples collected during 1976 had a mean I-131 concentration of 0.60 pCi/m^3. During 1977 this mean decreased to 0.32 pci/m3, and further decreased by a factor of ten to 0.032 pCi/m^3 in 1978. I-131 was not detected in samples collected from the control location during 1979 – 1981 and 1983 – 1985. I-131 was detected once at the control location during 1982 at a concentration of 0.039 pCi/m^3.

Iodine - 131 has been detected in samples collected from the onsite indicator locations during 1980 – 1983 and 1986 – 1987. The mean concentrations ranged from 0.013 pCi/m^3 in 1980 to a maximum of 0.119 pCi/m^3 in 1986. The maximum mean indicator I-131 concentration of 0.119 pCi/m^3 was the result of the Chernobyl accident. I-131 was detected in a total of 75 weekly samples collected during the 1986 sample program. The 1986 measured concentrations ranged from a minimum of 0.023 pCi/m^3 to a maximum of 0.36 pCi/m^3. Each positive detection of I-131 in samples collected in 1986 was the direct result of the Chernobyl Nuclear accident.

Historical data for I-131 are presented in Section 7.0, Tables 7-11 and 7-12.

5.2.4 DIRECT RADIATION THERMOLUMINESCENT DOSIMETERS (TLD)

A. Results Summary

Thermoluminescent dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the environment. As part of the 2002 environmental monitoring program, TLDs were placed at a total of 72 different environmental TLD locations (32 required by TS/ODCM and 40 optional locations). These TLDs were placed, collected and read each quarter of 2002. As a result of placing two TLDs at each location, the results presented in this report are the average of two TLD readings obtained for a given location.

The 72 TLDs were placed in the following five geographical locations around the site boundary:

- On-site (areas within the site boundary)
- Site Boundary (area of the site boundary in each of the 16 meteorological sectors)
- Off-site Sector (area four to five miles from the site in each of the eight land based meteorological sectors)
- Special Interest (areas of high population density and use), and
- Control (areas beyond significant influence of the site)

All geographical categories are required by the TS/ODCM with the exception of the On-site area which was optional. Description of the five geograpical categories and the designation of specific TLD locations that make up each category is presented in Section 3.1.5, TLD (Direct Radiation) of this report.

A summary of the 2002 dose rates for each of the five geographical locations are as follows:

	Dose in mrem per standard month		
Geographic Category	Min	Max	Mean
On-site (Optional)	3.5	13.6	5.3
Site Boundary (Inner Ring) * (1)	3.5	5.1	4.3
Off-site Sectors (Outer Ring) *	3.1	5.3	4.2
Special Interest * (2)	3.5	4.7	4.1
Control * (3)	3.4	5.2	4.1

* Geographical locations required by TS/ODCM

1 Only includes TLD results that are not affected by radwaste direct shine (TLD nos. 78, 79, 80, 81, 82, 83, 84, 7, 18)

2 Only includes TLD results required by TS/ODCM (TLD nos. 15, 56, 58, 96, 97, 98)

3 Only includes TLD results required by TS/ODCM (TLD nos. 14, 49)

Comparison of the annual mean dose rates associated with each geographical category conclude that there is no significant difference in annual dose to the public as a function of distance from the site boundary. The measured annual dose rate at the nearest resident to the site was consistent with the dose rates measured at the site boundary and control locations. The results for the Site

Boundary, Off-site Sectors and Special Interest (off-site) were well within expected normal variation when compared to the control TLD results.

The results for the 2002 environmental TLD monitoring program indicate that there is no signifcant increase in dose rates as a result of operations at the site. The use of hydrogen injection and the implementation of the Independent Spent Fuel Storage Installation (ISFSI) at the FitzPatrick plant did not measurably increase the ambient radiation exposure rate beyond the site boundary. The results of the 2002 TLD monitoring program demonstrate compliance with the off-site whole body dose limits for members of the public specified in 40CFR190 and 10CFR72.104(a).

B. Data Evaluation and Discussion

Direct Radiation (Gamma Dose) measurements were taken at 72 different environmental locations during 2002, 32 of which are required by the TS/ODCM. These locations are grouped into five geographical location categories for evaluation of results. The five categories include: Onsite, Site Boundary, Off-site Sector, Special Interest and Control Locations. All categories are required by the TS/ODCM with the exception of the Onsite TLDs. Onsite TLDs are placed at various locations within the site boundary to provide additional information on direct radiation levels at and around the Unit 1, Unit 2 and the Fitzpatrick facilities.

Onsite TLDs, are optional and are subdivided into three categories for which direct radiation results are evaluated. The 2002 direct radiation results for Onsite TLD locations were as follows:

1. Results for TLDs located near the Unit 1, Unit 2 and Fitzpatrick generating facilities and at previous or existing onsite air monitoring stations ranged from 3.5 to 13.6 mrem per standard month.

2. Results for TLDs located near the north shoreline of Unit 1, Unit 2 and Fitzpatrick facilities in close proximity to the Radwaste and Unit 1 Reactor Building ranged from 5.2 to 24.8 mrem per standard month.

3. Results for TLDs located onsite near the Energy Information Center and it's associated shoreline ranged from 3.7 to 5.5 mrem per standard month.

Site Boundary TLD results ranged from 3.5 to 9.4 mrem per standard month in 2002. This range included all TLDs placed in each of the 16 meteorological sectors in the general area of the site boundary. The highest dose rate measured at a location required by the TS/ODCM was 9.4 mrem per standard month. This TLD, (TLD 85) represents the site boundary maximum dose and is located in the WNW sector along the lake shore in close proximity to the NMP Unit 1 plant. The TLD locations along the lakeshore close to the plants (TLD #'s 75, 76, 77, 85, 86 and 87) are influenced by radwaste buildings and radwaste shipping activities. These locations and are not accessible to members of the public and the TLD results for these areas are not representative of dose rates measured at the remaining site boundary locations. The remaining Site Boundary TLD locations, which are located away from the plant ranged from 3.5 to 5.1 mrem per standard month resulting in an average dose rate of 4.3 mrem per standard month.

Off-site Sector TLDs, required by TS/ODCM, located 4 to 5 miles from the site in each of the 8 land based meteorological sectors ranged from 3.1 to 5.3 mrem per standard month with an average dose rate of 4.2 mrem per standard month.

Special Interest TLDs from all locations ranged from 3.2 to 5.1 mrem per standard month with a 2002 annual dose rate of 4.2 mrem per standard month.

The Control TLD group required by TS/ODCM utilizes locations positioned well beyond the site. 2002 Control TLD results ranged from 3.5 to 5.5 mrem per standard month with an annual average dose rate of 4.3 mrem per standard month. These results include both the TS/ODCM required control TLDs and the three additional control TLDs.

C. Dose Evaluation

2002 annual mean dose rates for each geographic location required by TS/ODCM are as follows:

Site Boundary:	4.3 mrem per standard month	(TLD Nos.: 78, 79, 80, 81, 82, 83, 84, 7, 18)
Off-site Sectors:	4.2 mrem per standard month	(TLD Nos.: 88, 89, 90, 91, 92, 93, 94, 95)
Special Interest:	4.1 mrem per standard month	(TLD #s: 15, 56, 58, 96, 97, 98)
Control:	4.1 mrem per standard month	(TLD #s 14, 49)

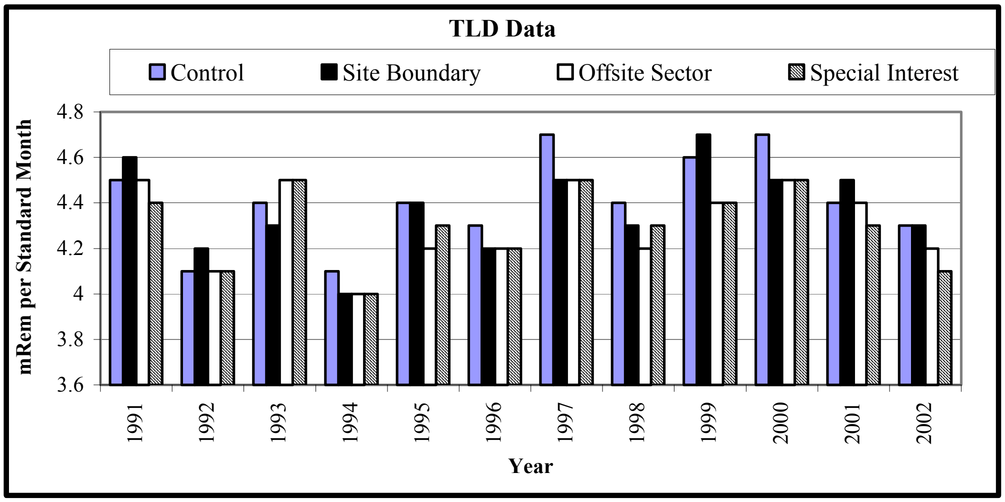
The measured mean dose rate in the proximity of the closest resident was 4.2 mrem per standard month (TLD Nos.: 108, 109) which is consistent with the control measurements of 4.1 mrem per standard month.

The mean annual dose for each of the geographic location categories demonstrates that there is no statistical difference in the annual dose as a function of distance from the site. The TLD program verifies that operations at the site do not measurably contribute to the levels of direct radiation present in the off-site environment.

D. Data Trends

A comparison of historical TLD results can be made using the different geographical categories of measurement locations. These include Site Boundary TLDs located in each of the 16 meteorological sectors, TLDs located off-site in each land based sector at a distance of 4 to 5 miles from the site, TLDs located at special interest areas and TLDs located at control locations. Site Boundary, Off-site Sector and Special Interest locations became effective in 1985; therefore trends for these results can only be evaluated for 1985 to the present.

The following graph illustrates TLD results for the Control, Site Boundary, Off-site Sectors and Special Interest groups from 1991 through 2002:



TLDs located at the Site Boundary averaged 4.3 mrem per standard month during 2002 (Site Boundary average results do not include TLDs influenced by radwaste buildings and radwaste shipping activities). This result is consistent with the previous five year average of 4.4 mrem per standard month.

Off-site Sector TLDs averaged 4.2 mrem per standard month during 2002. This result is also consistent with the previous five year average of 4.4 mrem per standard month for off-site sectors.

Special Interest TLD locations averaged 4.1 mrem per standard month during 2002 which is consistent with the previous five year average of 4.4 mrem per standard month.

The last group of TLD locations required by TS/ODCM is the Control Group. This group utilized TLD locations positioned well beyond the site. 2002 control results from all Control TLDs averaged 4.1 mrem per standard month, consistent with the previous five year average of 4.4 mrem per standard month. The 2002 TLD program results, when compared to the previous seventeen years, show no significant trends relative to increased dose rates in the environment.

Tables 7-15 through 7-20 show the historical environmental sample data for environmental TLDs.

5.2.5 MILK

A. Results Summary

A total of 108 milk samples were collected during the 2002 program and analyzed for gamma emitting radionuclides using gamma spectroscopy. In addition, each sample undergoes an iodine extraction procedure to determine the presence of Iodine - 131 (I-131).

Iodine-131, a possible plant related radionuclide, is measured to evaluate the land deposition, grass, cow, dose pathway to man. I-131 was not detected in any of the 108 milk samples collected in 2002 from the six milk sample locations.

Gamma spectral analyses of the bimonthly milk samples showed only naturally occurring radionuclides, such as K-40, were detected in milk samples collected during 2002. K-40 was detected in all indicator and control samples. K-40 is a naturally occurring radionuclide and is found in many environmental sample media.

The 2002 results demonstrate that routine operations at the Nine Mile Point site resulted in no measurable contribution to the "dose to the public" from the cow/milk pathway.

B. Sampling Overview

Milk samples were collected from five indicator locations and one control location. TS/ODCM require that three sample locations be within five miles of the site. Based on the milk animal census, there were no adequate milk sample locations within five miles of the site in 2002. Samples were collected from five farms located beyond the five mile requirement to ensure the continued monitoring of this important pathway. The five indicator locations ranged from 5.2 to 9.5 miles from the site. The control samples were collected from a farm located 15.6 miles from the site and in a low frequency wind sector (upwind). The geographical location of each sample location is listed below:

Location No.	Direction From Site	Distance (Miles)
76	SE	5.2
50	E	8.2
55	E	9.0
60	E	9.5
4	ESE	7.8
77 (Control)	SSW	13.9

Samples were collected from all locations from April through December, during the first and second half of each month. Samples were not required to be collected during January through March of 2002 as a result of I-131 not detected in samples collected during November and December of 2001 as stipulated in the TS/ODCM.

C. Data Evaluation and Discussion

Each milk sample is analyzed for gamma emitters using gamma spectral analysis. The I-131 analysis is performed using resin extraction followed by spectral analysis for each sample. I-131 and gamma analysis results for milk samples collected during 2002 are provided in Section 6.0, Table 6-11.

Iodine-131 was not detected in any indicator or control milk samples analyzed during 2002. All I-131 milk results were reported as Lower Limits of Detection (LLD). The LLD results for all samples ranged from < 0.34 to < 0.73 pCi/liter. No plant related radionuclides were detected in any milk sample collected in 2002. K-40 was the most abundant radionuclide detected, and found in every indicator and control sample collected. K-40 is a naturally occurring radionuclide and is found in many of the environmental media samples. The K-40 concentration for all milk samples analyzed ranged from 1310 to 2260 pCi/liter. Cs-137 was not detected in any indicator or control milk sample collected in 2002.

D. Dose Evaluation

The calculated dose as a result of plant effluents is not evaluated due to the fact that no plant related radionuclides were detected.

The dose to man from naturally occurring concentrations of K-40 in milk and other environmental media can be calculated. This calculation illustrates that the dose received due to exposure from plant effluents is negligible compared to the dose received from naturally occurring radionuclides. Significant levels of K-40 have been measured in environmental samples. A 70 kilogram (154 pound) adult contains approximately 0.1 microcuries of K-40 as a result of normal life functions (inhalation, consumption, etc.). The dose to bone tissue is about 20 mrem per year (Eisenbud) as a result of internally deposited naturally occurring K-40.

E. Data Trends

Man made radionuclides are not routinely detected in milk samples. In the past sixteen years Cs-137 was detected in 1986, 1987, and 1988. The mean Cs-137 indicator activities for those years were 8.6, 7.4 and 10.0 pCi/liter, respectively. I-131 was measured in two milk samples collected in 1997 from a single sample location, having a mean concentration of 0.35 pCi/liter and was of undetermined origin. The previous detection was in 1986 with a mean concentration of 13.6 pCi/liter. The 1986 activity was a result of the Chernobyl accident.

The comparison of 2002 data to historical results over the operating life of the plants show that Cs-137 and I-131 levels have decreased significantly since 1983.

Historical data of milk sample results for Cs-137 and I-131 are presented in Section 7.0, Tables 7-21 and 7-22.

5.2.6 FOOD PRODUCTS (VEGETATION)

A. Results Summary

There were no plant related radionuclides detected in the 21 food product samples collected and analyzed for the 2002 program.

Detectable levels of naturally occurring K–40 were measured in all control and indicator samples collected for the 2002 program. Ra-226, Be-7 and AcTh-228, all naturally occurring radionuclides were also detected intermittently in all of the samples collected in 2002. These results are consistent with the levels measured in 2001 and previous years.

The results of the 2002 sampling program demonstrate that there is no measurable impact on the dose to the public from the garden pathway as a result of plant operations.

B. Data Analysis and Discussion

Food product samples were collected from four indicator locations and one control location. The indicator locations are represented by nearby gardens in areas of highest D/Q (deposition factor) values based on historical meteorology and an annual garden census. The control location was a garden 15 miles away in a predominately upwind direction.

Food product samples collected during 2002 included only one variety considered to be an edible broadleaf vegetable. Cabbage, an edible broadleaf vegetable was collected from the control location and from only one indicator location. The general lack of edible broadleaf vegetation samples was the result of grower preference and such varieties were not available in local gardens. Where broadleaf vegetables were not available, non-edible broadleaf vegetation was collected. Non-edible vegetation consisting of squash leaves, grape leaves, and pepper leaves were collected for the 2002 program. The leaves of these plants were sampled as representative of broadleaf vegetation which is a measurement of radionuclide deposition. In addition to the broadleaf vegetation, tomato samples were collected from four locations.

Samples were collected during the late summer/fall harvest season. Each sample was analyzed for gamma emitters using gamma spectroscopy.

The analysis of food product samples collected during 2002 did not detect any plant related radionuclides. Results for the past five years also demonstrate that there is no buildup of plant related radionuclides in the garden food products grown in areas close to the site.

Naturally occurring Be-7, K-40, Ra-226 and AcTh-228 was detected in food product samples. The concentration of Be-7 in vegetation samples ranged from 0.15 to 1.29 pCi/g (wet). The concentration of K-40 in indicator and control samples ranged from 2.15 to 10.6 pCi/g (wet). Ra-226 and AcTh-228 were detected intermittently in the samples. The results for naturally occurring radionuclides are consistent with those of prior years. Analytical results for food products are found in Section 6.0, Table 6-12.

C. Dose Evaluation

The calculated dose as a result of plant effluents is not evaluated due to the fact that no plant related radionuclides were detected. The Food Product sampling program demonstrated no measurable off-site dose to man from this pathway as a result of operations of the plant located at Nine Mile Point.

D. Data Trends

Food product/vegetation sample results for the last five years demonstrate that there is no chronic deposition or buildup of plant related radionuclides in the garden food products in the environs near the site.

In the previous five year period, Cs-137 was detected in 1997 and 1999 at the indicator location. Since 1976 Cs-137 has been detected in ten separate years. Historical Cs-137 mean concentrations over the last twenty years ranged from a maximum of 0.047 pCi/g (wet) in 1985 to a minimum of 0.008 pCi/g (wet) in 1999. The trend for Cs-137 is a general reduction in concentration to a baseline concentration in the range of 0.01 to 0.012 pCi/g (wet), that is a residual from past atmospheric weapons testing.

Historical data of food product results are presented in Section 7.0, Tables 7-23 and 7-24.

5.2.7 LAND USE CENSUS RESULTS

A. Results Summary

The TS/ODCM require that an annual land use census be performed to identify potential new locations for milk sampling and for calculating the dose to man from plant effluents. In 2002 a milk animal census, a nearest resident census and a garden survey were performed.

No changes were required to the 2002 milk sampling program indicator or control locations based on the 2002 milk animal census.

The results of the closest residence census conducted in 2002 required no change to the closest resident location utilized by the Offsite Dose Calculation Manual (ODCM).

A garden census, not required by TS/ODCM, is performed to identify appropriate garden sampling locations and dose calculation receptors. Garden samples were collected from four locations listed in Table H-1 of the ODCM, Part 2 and identified in the census as active for 2002. See Table 3.3-1 for 2002 sampling locations.

B. Data Evaluation and Discussion

A land use census is conducted each year to determine the utilization of land in the vicinity of the Nine Mile Point site. The land use census consists of two types of surveys. A milk animal census is conducted to identify all milk animals within a distance of 10 miles from the site. The census, covering areas out to a distance of 10 miles exceeds the 5 mile distance required by the TS/ODCM. A resident census is conducted and is designed to identify the nearest resident in each meteorological sector out to a distance of 5 miles.

The milk animal census is an estimation of the number of cows and goats within an approximate 10 mile radius of the Nine Mile Point Site. The annual census is conducted during the first half of the grazing season by sending questionnaires to previous milk animal owners and also by road surveys to locate any possible new locations. In the event the questionnaires are not answered, the owners are contacted by telephone or in person. The local county agricultural agency is also contacted as an additional source of information concerning new milk animal locations in the vicinity of the site.

The number of milk animals located within an approximate 10 mile radius of the site was estimated to be 679 cows and 4 goats based on the 2002 land use census. The number of cows has decreased by 78 and the number of goats has remained the same with respect to the 2001 census. The goats identified during the census were not milking goats.

The results of the milk animal census are found in Section 6.0, Table 6-13.

The second type of census conducted is a residence census. The census is conducted in order to identify the closest residence within 5 miles in each of the 22.5 degree land based meteorological sectors. There are only eight sectors over land where residences are located within 5 miles. The water sectors include: N, NNE, NE, ENE, W, WNW, NW and NNW. The results of the residence census, showing the applicable sectors and degrees and distance of each of the nearest residence, are found in Section 6.0, Table 6-14. No changes were identified in the 2002 census for the closest resident in the land based meteorological sectors.

The nearest resident locations are illustrated in Section 3.3, Figure 3.3-5.

5.2.8 DIRECT RADIATION, THERMOLUMINESCENT DOSIMETERS (TLD) Independent Spent Fuel Storage Installation (ISFSI)

A. Results Summary

Thermoluminescent dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the localized environment of the ISFSI pad. Eighteen TLD locations are in place around the perimeter of the ISFSI pad. TLDs were placed at these locations prior to loading the first storage casks for baseline dose rate determination in the general area of the pad.

On April 25, 2002, the ISFSI facility was placed in service with the placement of the first storage cask on the pad. Two subsequent casks were moved to the storage facility on May 08, 2002 and May 21, 2002. Based on dose rates measured in the third and fourth quarter of 2002, the maximum dose rate increase above baseline dose rate was 18.9 mrem per standard month measured at the pad north perimeter fence. The minimum dose rate increase above the baseline dose rate was 0.4 mrem per standard month measured along the south perimeter fence. The three casks are located on the north end of the pad in close proximity to the north perimeter fence.

The implementation of the ISFSI project has resulted in no increase in dose at the site boundary or to the public. The analysis of off-site doses from direct radiation measurements, found in Section 5.4.2 of this report, concludes that there is no significant difference in annual dose to the public at or beyond the site boundary. The measured annual dose rate at the nearest residence to the site was consistent with the dose rates measured at the site boundary and the off-site control locations. The results for the Site Boundary, Off-site Sectors, and Special Interest (off-site) were well with in expected normal variation when compared to the Control TLD results. The results for the 2002 site environmental TLD monitoring program indicate that there is no significant increase in dose rates as a result of operations at the site. The use of hydrogen injection and the implementation of the Independent Spent Fuel Storage Installation (ISFSI) at the FitzPatrick plant did not measurably increase the ambient radiation exposure rate at or beyond the site boundary. The lack of a dose rate increase at or beyond the site boundary is consistent with design calculations performed to evaluate compliance with 10CFR72.104(a).

The measured results of the 2002 TLD monitoring program demonstrate compliance with the off-site dose limits to members of the public specified in 40CFR190 and 10CFR72.104(a).

B. Data Evaluation and Discussion

An array of eight TLD locations was established around the perimeter of the ISFSI pad 18 months prior to facility usage. Six months prior to the facility becoming operational, an additional 10 TLD locations were established at areas of interest on the facility perimeter. These preoperational TLDs were used for baseline dose rate determination. The TLDs are placed, collected and read each quarter. Two dosimeters are placed at each location and the average of the two dosimeters is reported. The quarterly results are standardized to units of mrem per standard month. The results are compared to baseline data to assess the contribution to ambient dose rates in the vicinity of the storage facility from casks as they are placed on the storage pad.

The ISFSI pad is located in the southeast corner of the restricted area of the site. The shortest distance from a cask on the storage pad to the controlled area boundary occurs at the Lake Ontario shoreline, approximately 1170 feet to the north of the ISFSI pad. The closest controlled area boundary bordered by land is the FitzPatrick site eastern property line, approximately 4300 feet to the east of the ISFSI pad.

C. Dose evaluation

The ISFSI pad is designed to accommodate a total of 18 loaded casks and is oriented north/south. The first three casks were loaded two wide on the north end of the pad. The maximum dose rate of 18.9 mrem per standard month above the baseline dose rate was measured at the north perimeter fence TLD location and is due to the close proximity of the storage casks to the fence. The lowest measured dose rate of 0.04 mrem per standard month above the baseline dose rate was measured at the southern perimeter fence as expected due to larger distance between the casks and the perimeter fence.

An evaluation of Site Boundary TLDs and Control TLDs results for 2002 shows that there is no increase in dose rate at or beyond the site boundary. A detailed discussion of this evaluation is found in Section 5.2.4. To isolate the possible effects on the site boundary dose from the implementation of the ISFSI project, the results of the environmental TLD network can be evaluated for a specific time period. Using the results from the third and fourth quarter 2002, the time frame of possible exposure contributions from the ISFSI is targeted. The TLD results for this period show no significant difference in control and site boundary dose rates.

	2002	
	3rd Quarter	4th Quarter
Site Boundary	4.4 mrem	3.9 mrem
Control	4.1 mrem	3.9 mrem

D. Data Trends

Due to the implementation of the ISFSI project in April of 2002 there are no data trends.

5.3 CONCLUSION

The Radiological Environmental Monitoring Program (REMP) is an on going program implemented to measure and document the radiological impact of JAFNPP operations on the local environment. The program is designed to detect and evaluate small changes in the radiological environment surrounding the site. Environmental media representing food sources consumed at the higher levels of the food chain, such as fish, food products and milk are part of a comprehensive sampling program. Results of all samples are reviewed closely to determine any possible impact to the environment or to man. In addition, program results are evaluated for possible short and long term historical trends.

The federal government has established dose limits to protect the public from radiation and radioactivity. The Nuclear Regulatory Commission (NRC) specifies a whole body dose limit of 100 mrem/yr to be received by the maximum exposed member of the general public. This limit is set forth in Section 1301, Part 20, Title 10 of the U.S. Code of Federal Regulations (10CFR20). The Environmental Protection Agency (EPA) limits the annual whole body dose to 25 mrem/yr, which is specified in Section 10, Part 190, Title 40, of the Code of Federal Regulations (40CFR190). Radiation exposure to members of the public, calculated based on the results of the Radiological Environmental Monitoring Program, are extremely small. The dose to members of the public from operations at the Nine Mile Point site, based on environmental measurement and calculations made from effluent releases, are determined to be a fraction of limits set forth by the NRC and EPA.

The results of the 2002 Radiological Environmental Surveillance Program continues to clearly demonstrate that there is no significant short term or chronic long term radiological impact on the environment in the vicinity of the Nine Mile Point site. No unusual radiological characteristics were measured or observed in the local environment. The Environmental Monitoring Program continues to demonstrate that the effluents from the site to the environment contribute no significant or even measurable radiation exposures to the general public as confirmed by the sampling and analysis of environmental media from recognized environmental pathways. Based on TLD results, there was no measurable increase in radiation levels beyond the site boundary as a result of the Hydrogen Water Chemistry Program and the implementation of the ISFSI project. Environmental radiation levels measured at the nearest residence are at the background level based on control station TLD results. The only measurable radiological impact on the environment continues to be the result of atmospheric weapons testing conducted in the early 1980s and the 1986 accident at the Chernobyl Nuclear Power Plant. Both of these source terms have contributed to a measurable inventory of Cs-137 in the environment. The results for the 2002 sample program demonstrate that the concentrations of manmade radionuclides continue to decline. This reduction in environmental background concentrations will allow for the site environmental program to become more sensitive to the measurable impact of plant operations on the environment as time goes on.

The environmental monitoring program detected two potentially plant related radionuclides in the sample media collected during 2002. Cs-137 was detected in two shoreline sediment samples and one fish sample. The source of the Cs-137 measured in these samples is considered to be fallout from past atmospheric nuclear weapons testing. The measured concentrations of Cs-137 in each of the samples, was small and consistent with historical values. The impact of these Cs-137 concentrations are minimal in terms of dose to man. Dose from man made sources in the environment are very small when compared to doses from naturally occurring sources of radioactivity. Small concentrations of tritium were measured in two surface water samples at both an indicator and a distant off-site location. The tritium concentrations are within the historical variation for levels of tritium occurring in Lake Ontario and are not attributed to operation of the FitzPatrick plant.

Radiation from naturally occurring radionuclides such as K-40 and Ra-226 contributed the vast majority of the total annual dose to members of the general public. The dose to members of the public, as result of plant operations, is extremely small in comparison to the dose contribution from natural background levels and sources other than the plant. Whole body dose in Oswego County due to natural sources is approximately 50-60 mrem per individual per year as demonstrated by control environmental TLDs. The fraction of the annual dose to man attributable to site operation remains insignificant.

From the collective results of the 2002 Radiological Environmental Surveillance Program, it can be concluded that the levels and variation of radioactivity in the environmental samples were consistent with background levels that would be expected for the lakeshore environment of the site.

5.4 REFERENCES

1. Radiological Effluent Technical Specifications, Appendix B to Facility Operating License No. DPR-59 For James A. FitzPatrick Nuclear Power Plant, New York Power Authority, Docket No. 50-333, Amendment 127.

2. U.S. Nuclear Regulatory Commission Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluent for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I", October, 1977.

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9. U.S. Nuclear Regulatory Commission Branch Technical Position to Regulatory Guide 4.8, "An Acceptable Radiological Environmental Monitoring Program", November 1979.

10. Eisenbud, Merril, Environmental Radioactivity, Third Edition, Academic Press, New York, New York, 1987.

11. Francis, C. W., Radiostrontium Movement in Soils and Uptake in Plants, Environmental Sciences Division, Oak Ridge National Laboratory, U.S. Department of Energy, 1978.

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14. U.S. Department of Health and Human Services, Preparedness and Response in Radiation Accidents, National Center of Devices and Radiological Health, Rockville, MD 20857, August, 1983.

15. Kathren, Ronald E., RADIOACTIVITY IN THE ENVIRONMENT: SOURCES, DISTRIBUTION, AND SURVEILLANCE, First Edition, Harwood Academic Press, New York, NY, 1984.

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17. Knoll, G., Radiation Detection and Measurement, Second Edition, John Wiley & Sons, New York, New York, 1989.

6.0 REPORT PERIOD ANALYTICAL RESULTS TABLES

6.1 Environmental sample data is summarized in table format. Tables are provided for select sample media and contain data based on actual values obtained over the year. These values are comprised of both positive values and LLD values where applicable.

6.2 The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability and with 5% probability of falsely concluding that a blank observation represents a "real" signal (see Section 3.7.3 for detailed explanation).

6.3 When the initial count of a sample indicates the presence of radioactivity, two recounts are normally performed. When a radionuclide is positively identified in two or more counts, the analytical results for that radionuclide is reported as the mean of the positive detections and the associated error for that mean (see Section 3.7.2 for methodology).

6.4 Many of the tables are footnoted with the term "Plant Radionuclides". Plant related radionuclides are radionuclides that are produced in the reactor as a result of plant operation either through the activation or fission process.

TABLE 6-1

CONCENTRATIONS OF GAMMA EMITTERS IN SHORELINE SEDIMENT SAMPLES - 2002

Results in Units of pCi/g (dry) ± 1 Sigma

SAMPLE LOCATION	COLLECTION DATE	GAMMA EMITTERS					
		K-40	Co-60	Cs-134	Cs-137	Zn-65	OTHERS†
Sunset Bay (05)***	04/24/02	18.4 ± 0.36	<0.048	<0.044	0.053 ± 0.01	<0.072	<LLD
	10/24/02	17.1 ± 0.35	<0.062	<0.060	0.045 ± 0.01	<0.125	<LLD
Lang's Beach (06, Control)***	04/24/02	12.2 ± 0.46	<0.036	<0.037	<0.033	<0.057	<LLD
	10/24/02	14.2 ± 0.41	<0.031	<0.034	<0.032	<0.051	<LLD

† Plant related radionuclides.
*** Corresponds to sample locations noted on Figure 3.3-5.

TABLE 6-2

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES - 2002

Results in Units of pCi/g (wet) ± 1 Sigma

DATE	TYPE	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	OTHERSH
					FITZPATRICK (03)***					
05/29/02	Smallmouth Bass	4.50 ± 0.34	<0.042	<0.037	<0.085	<0.042	<0.098	<0.031	<0.031	<LLD
05/29/02	Brown Trout	4.43 ± 0.29	<0.027	<0.029	<0.087	<0.035	<0.078	<0.029	<0.032	<LLD
05/29/02	Lake Trout	4.02 ± 0.24	<0.024	<0.031	<0.078	<0.030	<0.066	<0.023	<0.024	<LLD
5/29/02	Walleye	4.72 ± 0.22	<0.021	<0.022	<0.065	<0.024	<0.049	<0.019	<0.023	<LLD
09/05/02	Smallmouth Bass	4.27 ± 0.11	<0.022	<0.024	<0.070	<0.024	<0.057	<0.018	<0.022	<LLD
09/05/02	Brown Trout	5.54 ± 0.24	<0.024	<0.025	<0.078	<0.029	<0.066	<0.016	<0.023	<LLD
09/05/02	Salmon	5.91 ± 0.20	<0.024	<0.024	<0.071	<0.022	<0.031	<0.014	<0.021	<LLD

H Plant related radionuclides.
*** Corresponds to sample location noted on Figure 3.3-5.

TABLE 6-2 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES - 2002

Results in Units of pCi/g (wet) ± 1 Sigma

DATE	TYPE	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	OTHERSH
					NINE MILE POINT (02)***					
05/29/02	Smallmouth Bass	4.30 ± 0.11	<0.021	<0.022	<0.070	<0.018	<0.047	<0.020	<0.020	<LLD
05/29/02	Brown Trout	5.37 ± 0.22	<0.023	<0.024	<0.077	<0.027	<0.065	<0.023	<0.020	<LLD
05/29/02	Lake Trout	4.80 ± 0.14	<0.028	<0.030	<0.081	<0.028	<0.075	<0.021	<0.025	<LLD
06/04/02	Walleye	4.28 ± 0.12	<0.019	<0.019	<0.063	<0.022	<0.054	<0.019	0.0016 ± 0.05	<LLD
09/05/02	Smallmouth Bass	3.89 ± 0.24	<0.020	<0.024	<0.092	<0.027	<0.062	<0.023	<0.024	<LLD
09/10/02	Brown Trout	4.78 ± 0.21	<0.020	<0.021	<0.067	<0.022	<0.054	<0.019	<0.020	<LLD
09/10/02	Salmon	4.45 ± 0.20	<0.020	<0.017	<0.056	<0.022	<0.044	<0.012	<0.020	<LLD

H Plant related radionuclides.
*** Corresponds to sample locations noted on Figure 3.3-5.

TABLE 6-2 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES - 2002

Results in Units of pCi/g (wet) ± 1 Sigma

DATE	TYPE	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	OTHERS[H]
					OSWEGO HARBOR (CONTROL) (00)***					
06/04/02	Smallmouth Bass	4.49 ± 0.36	<0.038	<0.035	<0.070	<0.038	<0.092	<0.032	<0.039	<LLD
05/30/02	Brown Trout	4.31 ± 0.28	<0.028	<0.031	<0.094	<0.026	<0.090	<0.028	<0.032	<LLD
06/04/02	Lake Trout	4.42 ± 0.29	<0.033	<0.028	<0.089	<0.033	<0.077	<0.028	<0.023	<LLD
05/30/02	Walleye	5.21 ± 0.37	<0.039	<0.041	<0.113	<0.040	<0.085	<0.031	<0.030	<LLD
09/13/02	Smallmouth Bass	5.56 ± 0.23	<0.023	<0.023	<0.066	<0.023	<0.056	<0.023	<0.021	<LLD
09/13/02	Brown Trout	5.53 ± 0.19	<0.019	<0.021	<0.051	<0.020	<0.050	<0.013	<0.022	<LLD
09/13/02	Salmon	4.10 ± 0.19	<0.018	<0.019	<0.053	<0.017	<0.044	<0.018	<0.018	<LLD

H Plant related radionuclides.
*** Corresponds to sample location noted on Figure 3.3-5.

TABLE 6-3

CONCENTRATIONS OF TRITIUM IN SURFACE WATER - 2002
(QUARTERLY COMPOSITE SAMPLES)

Results in Units of pCi/liter ± 1 Sigma

STATION CODE	PERIOD	DATE	TRITIUM
FITZPATRICK* (03, INLET)***	First Quarter	1/2/02 - 4/1/02	< 270
	Second Quarter	4/1/02 - 7/2/02	297 ± 85
	Third Quarter	7/2/02 - 10/01/02	< 290
	Fourth Quarter	10/1/02 – 1/2/03	< 270
OSWEGO STEAM* STATION (08, CONTROL)***	First Quarter	12/31/01 - 3/29/02	< 260
	Second Quarter	3/29/02 - 6/28/02	< 270
	Third Quarter	6/28/02 - 9/30/02	< 280
	Fourth Quarter	9/30/02 – 1/2/03	< 270
NINE MILE POINT UNIT 1** (09, INLET)***	First Quarter	12/31/01 - 3/29/02	< 270
	Second Quarter	3/29/02 - 6/28/02	< 270
	Third Quarter	6/28/02 - 9/30/02	< 290
	Fourth Quarter	9/30/02 – 1/2/03	< 270
NINE MILE POINT UNIT 2** (11, INLET)***	First Quarter	12/31/01 - 3/29/02	< 270
	Second Quarter	3/29/02 - 6/28/02	< 270
	Third Quarter	6/28/02 - 9/30/02	< 290
	Fourth Quarter	9/30/02 – 1/2/03	< 270
OSWEGO CITY WATER** (10)***	First Quarter	12/31/01 - 3/29/02	< 260
	Second Quarter	3/29/02 - 6/28/02	268 ± 83
	Third Quarter	6/28/02 - 9/30/02	< 290
	Fourth Quarter	9/30/02 – 1/2/03	< 270

* Sample location required by TS/ODCM.
** Optional sample location.
*** Corresponds to sample location noted on Figure 3.3-4.

TABLE 6-4

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 2002
Results in Units of pCi/liter ± 1 Sigma

OSWEGO STEAM STATION* (08, CONTROL)***

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<10.8	<7.50	<10.9	<9.54	<12.5	<6.40
Cs-134	<1.99	<1.53	<3.16	<2.03	<3.19	<2.64
Cs-137	<2.96	<2.64	<2.90	<2.97	<3.01	<2.72
Zr-95	<5.52	<5.65	<6.55	<6.32	<6.61	<5.48
Nb-95	<3.68	<3.44	<4.62	<4.10	<3.97	<3.11
Co-58	<3.38	<3.04	<3.43	<3.63	<3.90	<2.88
Mn-54	<2.95	<2.93	<3.29	<3.33	<2.72	<2.42
Fe-59	<8.88	<8.13	<9.52	<10.9	<11.5	<7.35
Zn-65	<7.17	<6.13	<8.57	<4.81	<8.30	<7.01
Co-60	<3.13	<2.63	<3.70	<3.81	<3.63	<2.64
K-40	189 ± 16.1	179 ± 15.3	332 ± 20.9	361 ± 21.0	173 ± 18.9	222 ± 17.6
Ba/La-140	<8.05	<7.00	<10.0	<8.57	<10.2	<6.82

NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<10.1	<8.65	<10.5	<9.18	<6.38	<6.96
Cs-134	<2.03	<3.02	<2.90	<2.03	<1.43	<2.54
Cs-137	<2.92	<2.63	<2.82	<3.07	<2.27	<2.52
Zr-95	<5.75	<6.51	<6.50	<6.25	<4.12	<5.28
Nb-95	<4.06	<3.68	<4.45	<4.02	<2.65	<3.63
Co-58	<3.53	<3.31	<3.51	<3.57	<2.43	<2.86
Mn-54	<3.16	<3.31	<3.18	<2.96	<2.08	<2.62
Fe-59	<11.3	<10.7	<11.9	<10.5	<5.97	<7.50
Zn-65	<8.15	<8.52	<7.54	<6.95	<2.83	<6.31
Co-60	<3.81	<3.54	<3.54	<3.74	<1.93	<2.95
K-40	394 ± 21.9	330 ± 21.0	291 ± 20.5	400 ± 23.1	238 ± 13.2	190 ± 16.3
Ba/La-140	<8.69	<7.77	<9.54	<9.21	<5.07	<6.51

* Sample location required by TS/ODCM.
*** Corresponds to sample location noted on Figure 3.3-4.

TABLE 6-4 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 2002
Results in Units of pCi/liter ± 1 Sigma

FITZPATRICK* (03, INLET)***

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<9.86	<5.81	<8.47	<10.9	<13.1	<12.7
Cs-134	<2.90	<1.38	<2.99	<3.68	<1.99	<4.25
Cs-137	<2.40	<2.10	<2.78	<3.53	<2.89	<3.39
Zr-95	<5.12	<4.47	<5.14	<8.12	<5.89	<6.82
Nb-95	<3.30	<2.86	<3.18	<4.16	<4.49	<4.41
Co-58	<2.92	<2.58	<3.15	<4.80	<3.70	<4.07
Mn-54	<2.73	<2.31	<2.67	<3.92	<3.21	<3.86
Fe-59	<9.04	<6.23	<9.15	<12.2	<10.0	<12.1
Zn-65	<5.79	<2.86	<6.04	<8.71	<8.15	<9.14
Co-60	<3.03	<2.28	<2.55	<3.40	<3.54	<3.55
K-40	170 ± 15.1	262 ± 13.4	96.8 ± 13.2	148 ± 21.4	341 ± 21.1	127 ± 18.3
Ba/La-140	<6.77	<4.20	<6.82	<8.32	<11.1	<10.7

NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<9.62	<12.7	<8.83	<6.55	<11.1	<7.36
Cs-134	<1.45	<3.36	<2.73	<1.51	<3.24	<1.65
Cs-137	<2.08	<3.28	<3.09	<3.08	<2.81	<2.72
Zr-95	<4.35	<8.31	<5.67	<5.36	<6.46	<5.67
Nb-95	<3.08	<5.52	<4.21	<3.56	<5.14	<3.49
Co-58	<2.35	<4.12	<3.57	<2.90	<3.79	<2.67
Mn-54	<2.10	<3.87	<3.11	<2.33	<3.34	<2.73
Fe-59	<8.05	<10.9	<11.4	<9.53	<11.1	<8.28
Zn-65	<2.94	<8.38	<7.61	<6.41	<7.66	<6.36
Co-60	<1.84	<3.43	<3.20	<2.52	<3.43	<2.87
K-40	273 ± 14.0	199 ± 22.1	325 ± 21.7	160 ± 15.2	171 ± 22.4	212 ± 17.5
Ba/La-140	<6.34	<10.7	<7.88	<7.03	<9.57	<7.21

* Sample location required by TS/ODCM.
*** Corresponds to sample location noted on Figure 3.3-4.

TABLE 6-4 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 2002
Results in Units of pCi/liter ± 1 Sigma

NINE MILE POINT UNIT 1** (09, INLET)***

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<12.0	<8.29	<9.95	<7.55	<14.3	<7.11
Cs-134	<2.12	<3.46	<2.06	<2.73	<3.65	<3.06
Cs-137	<2.93	<3.72	<2.94	<2.57	<3.69	<2.72
Zr-95	<6.56	<6.80	<5.18	<5.11	<6.68	<5.49
Nb-95	<4.16	<3.83	<3.62	<3.34	<5.36	<3.33
Co-58	<3.73	<3.81	<3.07	<2.99	<4.41	<2.92
Mn-54	<3.37	<3.82	<2.79	<2.42	<4.55	<3.07
Fe-59	<12.1	<11.0	<9.72	<7.91	<13.9	<10.0
Zn-65	<8.62	<7.08	<6.47	<6.10	<9.07	<5.28
Co-60	<4.04	<4.11	<2.66	<2.80	<3.92	<3.29
K-40	351 ± 21.5	209 ± 23.6	139 ± 14.8	155 ± 15.4	206 ± 25.1	144 ± 14.5
Ba/La-140	<8.37	<9.37	<7.99	<6.32	<9.78	<6.19
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<7.42	<9.53	<7.65	<7.30	<7.47	<9.58
Cs-134	<2.75	<3.43	<1.48	<2.62	<2.92	<3.54
Cs-137	<2.61	<3.11	<2.33	<2.97	<2.74	<3.41
Zr-95	<5.44	<7.57	<4.07	<4.85	<5.05	<6.51
Nb-95	<3.36	<4.28	<3.04	<3.29	<3.40	<4.75
Co-58	<3.08	<4.11	<2.45	<2.63	<2.64	<3.83
Mn-54	<2.44	<3.66	<2.07	<2.78	<3.00	<3.17
Fe-59	<8.49	<11.3	<6.43	<8.80	<8.63	<11.4
Zn-65	<5.89	<6.99	<2.83	<6.61	<5.96	<7.25
Co-60	<2.72	<4.14	<1.90	<3.11	<2.65	<3.89
K-40	152 ± 16.0	167 ± 21.0	229 ± 13.0	179 ± 16.0	137 ± 14.4	241 ± 22.4
Ba/La-140	<7.32	<7.92	<5.75	<7.78	<7.21	<8.72

** Optional sample location.
*** Corresponds to sample location noted on Figure 3.3-4.

TABLE 6-4 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 2002
Results in Units of pCi/liter ± 1 Sigma

NINE MILE POINT UNIT 2** (11, INLET)***

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<9.96	<7.22	<9.19	<8.53	<11.4	<8.20
Cs-134	<2.46	<2.85	<2.60	<2.71	<3.45	<3.42
Cs-137	<2.36	<2.61	<2.54	<2.52	<3.00	<2.96
Zr-95	<6.12	<5.18	<4.52	<5.31	<6.38	<5.90
Nb-95	<3.79	<3.02	<3.32	<3.90	<3.70	<3.77
Co-58	<3.19	<2.85	<3.25	<3.27	<3.49	<3.26
Mn-54	<2.78	<2.81	<2.93	<2.77	<3.09	<3.36
Fe-59	<9.40	<8.88	<8.46	<9.26	<10.1	<8.98
Zn-65	<5.63	<6.25	<5.66	<6.17	<6.19	<8.26
Co-60	<3.19	<2.80	<2.73	<3.15	<2.93	<3.41
K-40	212 ± 16.5	120 ± 14.6	141 ± 15.0	150 ± 15.1	97.3 ± 14.6	365 ± 22.8
Ba/La-140	<9.28	<6.93	<6.96	<6.41	<10.3	<7.50
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<8.18	<7.57	<8.28	<7.84	<10.3	<7.99
Cs-134	<2.53	<3.00	<2.79	<1.61	<3.43	<2.94
Cs-137	<2.49	<2.54	<2.59	<2.43	<3.21	<2.72
Zr-95	<5.38	<5.51	<5.45	<5.52	<8.22	<4.86
Nb-95	<3.17	<3.43	<3.68	<3.64	<4.65	<3.44
Co-58	<3.10	<2.84	<2.79	<3.24	<3.78	<2.89
Mn-54	<2.47	<2.84	<2.62	<2.41	<3.42	<2.86
Fe-59	<8.62	<8.17	<8.73	<9.23	<12.4	<9.93
Zn-65	<6.24	<6.14	<6.25	<5.93	<8.19	<6.27
Co-60	<2.99	<2.75	<2.68	<2.82	<3.52	<2.80
K-40	213 ± 16.2	151 ± 14.8	187 ± 16.3	156 ± 15.3	161 ± 18.2	135 ± 14.2
Ba/La-140	<6.65	<7.14	<8.88	<6.73	<9.61	<6.58

** Optional sample location.
*** Corresponds to sample location noted on Figure 3.3-4.

TABLE 6-4 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 2002
Results in Units of pCi/liter ± 1 Sigma

OSWEGO CITY WATER** (10)***

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<12.6	<7.88	<8.89	<6.86	<13.7	<10.2
Cs-134	<2.14	<1.95	<2.76	<1.43	<3.54	<1.94
Cs-137	<3.02	<2.78	<3.01	<2.18	<3.19	<3.02
Zr-95	<6.50	<6.23	<5.58	<4.50	<7.40	<6.59
Nb-95	<4.81	<3.98	<3.30	<3.12	<4.69	<4.19
Co-58	<3.81	<3.57	<2.82	<2.69	<4.03	<3.59
Mn-54	<3.13	<3.18	<2.65	<2.17	<3.23	<3.15
Fe-59	<10.5	<10.6	<9.30	<6.69	<14.4	<9.52
Zn-65	<8.25	<7.84	<6.97	<2.89	<7.92	<8.14
Co-60	<3.58	<3.62	<3.05	<2.27	<3.75	<3.20
K-40	385 ± 23.3	370 ± 21.8	141 ± 15.7	260 ± 13.7	331 ± 24.8	355 ± 21.0
Ba/La-140	<10.4	<7.39	<8.35	<5.50	<12.0	<8.07
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<11.3	<6.24	<11.7	<6.85	<6.57	<7.88
Cs-134	<3.65	<1.42	<3.59	<1.44	<2.45	<3.03
Cs-137	<3.78	<2.15	<3.63	<2.13	<2.72	<2.75
Zr-95	<7.01	<4.18	<7.03	<4.02	<5.23	<5.78
Nb-95	<4.82	<2.51	<5.21	<2.84	<3.03	<3.81
Co-58	<3.90	<2.39	<4.17	<2.49	<2.77	<3.31
Mn-54	<3.72	<2.20	<4.15	<2.11	<2.57	<3.08
Fe-59	<13.3	<5.88	<12.8	<5.78	<8.93	<10.1
Zn-65	<8.34	<4.88	<7.42	<2.99	<6.48	<3.75
Co-60	<4.15	<2.26	<3.53	<2.16	<2.80	<3.81
K-40	167 ± 19.8	250 ± 13.4	213 ± 20.5	256 ± 13.9	164 ± 15.6	377 ± 22.5
Ba/La-140	<10.1	<4.96	<11.1	<4.84	<5.99	<7.70

** Optional sample location.
*** Corresponds to sample location noted on Figure 3.3-4.

TABLE 6-5

NMPNS/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES – OFF SITE STATIONS - 2002
GROSS BETA ACTIVITY pCi/m^3 ± 1 SIGMA

LOCATION

Week Start Date	R-1* OFF-SITE	R-2* OFF-SITE	R-3* OFF-SITE	R-4* OFF-SITE	R-5* OFF-SITE	D-2** OFF-SITE	E** OFF-SITE	F** OFF-SITE	G** OFF-SITE
01/02/02	0.0215 ± 0.002	0.0236 ± 0.002	0.0206 ± 0.002	0.0210 ± 0.002	0.0221 ± 0.002	0.0202 ± 0.002	0.0213 ± 0.002	0.0193 ± 0.002	0.0181 ± 0.002
01/08/02	0.0167 ± 0.002	0.0140 ± 0.001	0.0150 ± 0.002	0.0146 ± 0.002	0.0150 ± 0.002	0.0130 ± 0.002	0.0153 ± 0.002	0.0158 ± 0.002	0.0148 ± 0.001
01/15/02	0.0134 ± 0.002	0.0134 ± 0.001	0.0108 ± 0.001	0.0164 ± 0.002	0.0130 ± 0.002	0.0121 ± 0.002	0.0155 ± 0.002	0.0132 ± 0.001	0.0122 ± 0.001
01/22/02	0.0228 ± 0.002	0.0228 ± 0.002	0.0189 ± 0.002	0.0224 ± 0.002	0.0236 ± 0.002	0.0179 ± 0.002	0.0243 ± 0.002	0.0209 ± 0.002	0.0200 ± 0.002
01/29/02	0.0136 ± 0.002	0.0159 ± 0.002	0.0163 ± 0.002	0.0173 ± 0.002	0.0172 ± 0.002	0.0164 ± 0.002	0.0176 ± 0.002	0.0149 ± 0.002	0.0131 ± 0.001
02/05/02	0.0241 ± 0.002	0.0250 ± 0.002	0.0239 ± 0.002	0.0250 ± 0.002	0.0266 ± 0.002	0.0200 ± 0.002	0.0263 ± 0.002	0.0238 ± 0.002	0.0211 ± 0.002
02/12/02	0.0131 ± 0.002	0.0144 ± 0.001	0.0120 ± 0.001	0.0119 ± 0.001	0.0128 ± 0.002	0.0138 ± 0.002	0.0155 ± 0.002	0.0122 ± 0.001	0.0105 ± 0.001
02/19/02	0.0164 ± 0.002	0.0147 ± 0.002	0.0163 ± 0.002	0.0149 ± 0.002	0.0145 ± 0.002	0.0168 ± 0.002	0.0144 ± 0.002	0.0141 ± 0.001	0.0138 ± 0.001
02/26/02	0.0160 ± 0.002	0.0124 ± 0.001	0.0132 ± 0.002	0.0142 ± 0.002	0.0163 ± 0.002	0.0179 ± 0.002	0.0123 ± 0.002	0.0142 ± 0.001	0.0128 ± 0.001
03/05/02	0.0192 ± 0.002	0.0196 ± 0.002	0.0201 ± 0.002	0.0214 ± 0.002	0.0229 ± 0.002	0.0186 ± 0.002	0.0230 ± 0.002	0.0198 ± 0.002	0.0210 ± 0.002
03/12/02	0.0195 ± 0.002	0.0153 ± 0.002	0.0181 ± 0.002	0.0201 ± 0.002	0.0197 ± 0.002	0.0165 ± 0.002	0.0191 ± 0.002	0.0192 ± 0.002	0.0165 ± 0.002
03/19/02	0.0144 ± 0.002	0.0111 ± 0.001	0.0140 ± 0.002	0.0159 ± 0.002	0.0153 ± 0.002	0.0178 ± 0.002	0.0136 ± 0.002	0.0133 ± 0.002	0.0102 ± 0.001
03/26/02	0.0148 ± 0.002	0.0137 ± 0.001	0.0137 ± 0.002	0.0134 ± 0.001	0.0139 ± 0.002	0.0137 ± 0.002	0.0129 ± 0.002	0.0144 ± 0.002	0.0129 ± 0.001
04/02/02	0.0200 ± 0.002	0.0152 ± 0.002	0.0193 ± 0.002	0.0163 ± 0.002	0.0185 ± 0.002	0.0141 ± 0.002	0.0193 ± 0.002	0.0173 ± 0.002	0.0150 ± 0.001
04/09/02	0.0151 ± 0.002	0.0132 ± 0.001	0.0156 ± 0.002	0.0147 ± 0.002	0.0122 ± 0.002	0.0146 ± 0.002	0.0118 ± 0.002	0.0136 ± 0.002	0.0159 ± 0.001
04/16/02	0.0185 ± 0.002	0.0207 ± 0.002	0.0177 ± 0.002	0.0197 ± 0.002	0.0185 ± 0.002	0.0205 ± 0.002	0.0204 ± 0.002	0.0175 ± 0.002	0.0182 ± 0.002
04/23/02	0.0150 ± 0.002	0.0155 ± 0.002	0.0157 ± 0.002	0.0137 ± 0.002	0.0146 ± 0.002	0.0166 ± 0.002	0.0142 ± 0.002	0.0164 ± 0.002	0.0145 ± 0.001
04/30/02	0.0121 ± 0.002	0.0118 ± 0.002	0.0114 ± 0.001	0.0143 ± 0.002	0.0111 ± 0.002	0.0140 ± 0.002	0.0145 ± 0.002	0.0126 ± 0.002	0.0127 ± 0.001
05/07/02	0.0077 ± 0.001	0.0075 ± 0.001	0.0126 ± 0.001	0.0085 ± 0.001	0.0097 ± 0.001	0.0098 ± 0.002	0.0101 ± 0.002	0.0090 ± 0.001	0.0087 ± 0.001
05/14/02	0.0071 ± 0.001	0.0102 ± 0.001	0.0066 ± 0.001	0.0114 ± 0.002	0.0087 ± 0.001	0.0095 ± 0.001	0.0096 ± 0.001	0.0090 ± 0.001	0.0088 ± 0.001
05/21/02	0.0135 ± 0.002	0.0120 ± 0.001	0.0110 ± 0.001	0.0107 ± 0.001	0.0110 ± 0.001	0.0121 ± 0.002	0.0118 ± 0.002	0.0112 ± 0.001	0.0114 ± 0.001
05/28/02	0.0125 ± 0.002	0.0123 ± 0.001	0.0123 ± 0.001	0.0143 ± 0.002	0.0155 ± 0.002	0.0146 ± 0.002	0.0148 ± 0.002	0.0161 ± 0.002	0.0171 ± 0.002
06/04/02	0.0133 ± 0.002	0.0129 ± 0.002	0.0144 ± 0.002	0.0132 ± 0.002	0.0151 ± 0.002	0.0127 ± 0.001	0.0142 ± 0.002	0.0139 ± 0.002	0.0141 ± 0.002
06/11/02	0.0080 ± 0.001	0.0058 ± 0.001	0.0069 ± 0.001	0.0066 ± 0.001	0.0075 ± 0.001	0.0074 ± 0.001	0.0073 ± 0.001	0.0097 ± 0.001	0.0081 ± 0.001
06/18/02	0.0178 ± 0.002	0.0229 ± 0.002	0.0216 ± 0.002	0.0179 ± 0.002	0.0208 ± 0.002	0.0193 ± 0.002	0.0200 ± 0.002	0.0188 ± 0.002	0.0210 ± 0.002
06/25/02	0.0201 ± 0.002	0.0242 ± 0.002	0.0220 ± 0.002	0.0207 ± 0.002	0.0251 ± 0.002	0.0228 ± 0.002	0.0267 ± 0.002	0.0213 ± 0.002	0.0259 ± 0.002

* Sample location required by TS/ODCM.
** Optional sample location.

TABLE 6-5 (continued)

NMPNS/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES – OFFSITE STATIONS - 2002
GROSS BETA ACTIVITY pCi/m^3 ± 1 SIGMA

LOCATION

Week Start Date	R-1* OFF-SITE	R-2* OFF-SITE	R-3* OFF-SITE	R-4* OFF-SITE	R-5* OFF-SITE	D-2** OFF-SITE	E** OFF-SITE	F** OFF-SITE	G** OFF-SITE
07/02/02	0.0263 ± 0.002	0.0228 ± 0.002	0.0239 ± 0.002	0.0250 ± 0.002	0.0219 ± 0.002	0.0232 ± 0.002	0.0219 ± 0.002	0.0204 ± 0.002	0.0208 ± 0.002
07/09/02	0.0152 ± 0.002	0.0204 ± 0.002	0.0167 ± 0.002	0.0154 ± 0.002	0.0172 ± 0.002	0.0164 ± 0.002	0.0185 ± 0.002	0.0156 ± 0.002	0.0150 ± 0.002
07/16/02	0.0194 ± 0.002	0.0201 ± 0.002	0.0195 ± 0.002	0.0197 ± 0.002	0.0188 ± 0.002	0.0215 ± 0.002	0.0220 ± 0.002	0.0161 ± 0.002	0.0205 ± 0.002
07/23/02	0.0135 ± 0.002	0.0111 ± 0.001	0.0123 ± 0.001	0.0133 ± 0.002	0.0127 ± 0.001	0.0115 ± 0.001	0.0132 ± 0.001	0.0138 ± 0.001	0.0138 ± 0.002
07/30/02	0.0205 ± 0.002	0.0169 ± 0.002	0.0174 ± 0.002	0.0195 ± 0.002	0.0196 ± 0.002	0.0210 ± 0.002	0.0204 ± 0.002	0.0187 ± 0.002	0.0195 ± 0.002
08/06/02	0.0145 ± 0.002	0.0170 ± 0.002	0.0163 ± 0.002	0.0168 ± 0.002	0.0176 ± 0.002	0.0163 ± 0.002	0.0151 ± 0.002	0.0186 ± 0.002	0.0177 ± 0.002
08/13/02	0.0193 ± 0.002	0.0210 ± 0.002	0.0217 ± 0.002	0.0223 ± 0.002	0.0266 ± 0.002	0.0238 ± 0.002	0.0218 ± 0.002	0.0228 ± 0.002	0.0212 ± 0.002
08/20/02	0.0154 ± 0.002	0.0138 ± 0.002	0.0136 ± 0.001	0.0112 ± 0.001	0.0140 ± 0.002	0.0151 ± 0.002	0.0136 ± 0.001	0.0148 ± 0.002	0.0131 ± 0.001
08/27/02	0.0112 ± 0.001	0.0111 ± 0.001	0.0104 ± 0.001	0.0112 ± 0.001	0.0123 ± 0.001	0.0117 ± 0.001	0.0162 ± 0.002	0.0109 ± 0.001	0.0100 ± 0.001
09/03/02	0.0167 ± 0.002	0.0175 ± 0.002	0.0181 ± 0.002	0.0181 ± 0.002	0.0189 ± 0.002	0.0190 ± 0.002	0.0171 ± 0.002	0.0162 ± 0.002	0.0212 ± 0.002
09/10/02	0.0205 ± 0.002	0.0230 ± 0.002	0.0250 ± 0.002	0.0215 ± 0.002	0.0201 ± 0.002	0.0240 ± 0.002	0.0231 ± 0.002	0.0185 ± 0.002	0.0211 ± 0.002
09/17/02	0.0234 ± 0.002	0.0232 ± 0.002	0.0243 ± 0.002	0.0204 ± 0.002	0.0240 ± 0.002	0.0215 ± 0.002	0.0198 ± 0.002	0.0209 ± 0.002	0.0225 ± 0.002
09/24/02	0.0193 ± 0.002	0.0189 ± 0.002	0.0225 ± 0.002	0.0194 ± 0.002	0.0222 ± 0.002	0.0223 ± 0.002	0.0212 ± 0.002	0.0206 ± 0.002	0.0216 ± 0.002
10/01/02	0.0175 ± 0.002	0.0151 ± 0.002	0.0149 ± 0.002	0.0131 ± 0.002	0.0151 ± 0.002	0.0147 ± 0.002	0.0168 ± 0.002	0.0156 ± 0.002	0.0160 ± 0.002
10/08/02	0.0139 ± 0.001	0.0116 ± 0.001	0.0135 ± 0.001	0.0131 ± 0.001	0.0098 ± 0.001	0.0125 ± 0.001	0.0122 ± 0.001	0.0131 ± 0.001	0.0126 ± 0.001
10/15/02	0.0101 ± 0.001	0.0100 ± 0.001	0.0105 ± 0.001	0.0103 ± 0.001	0.0108 ± 0.001	0.0105 ± 0.001	0.0114 ± 0.002	0.0085 ± 0.001	0.0120 ± 0.001
10/22/02	0.0111 ± 0.001	0.0121 ± 0.001	0.0108 ± 0.001	0.0122 ± 0.001	0.0105 ± 0.001	0.0144 ± 0.002	0.0104 ± 0.001	0.0121 ± 0.001	0.0112 ± 0.001
10/29/02	0.0108 ± 0.001	0.0117 ± 0.001	0.0106 ± 0.001	0.0120 ± 0.001	0.0136 ± 0.002	0.0127 ± 0.002	0.0146 ± 0.002	0.0120 ± 0.001	0.0140 ± 0.001
11/05/02	0.0249 ± 0.002	0.0232 ± 0.002	0.0247 ± 0.002	0.0217 ± 0.002	0.0211 ± 0.002	0.0216 ± 0.002	0.0216 ± 0.002	0.0217 ± 0.002	0.0239 ± 0.002
11/12/02	0.0164 ± 0.002	0.0150 ± 0.002	0.0160 ± 0.002	0.0133 ± 0.001	0.0135 ± 0.001	0.0147 ± 0.002	0.0139 ± 0.001	0.0147 ± 0.001	0.0168 ± 0.002
11/19/02	0.0114 ± 0.001	0.0148 ± 0.002	0.0155 ± 0.002	0.0127 ± 0.001	0.0146 ± 0.002	0.0138 ± 0.001	0.0120 ± 0.001	0.0159 ± 0.002	0.0166 ± 0.002
11/26/02	0.0126 ± 0.001	0.0142 ± 0.001	0.0102 ± 0.001	0.0094 ± 0.001	0.0102 ± 0.001	0.0115 ± 0.001	0.0132 ± 0.001	0.0108 ± 0.001	0.0112 ± 0.001
12/03/02	0.0204 ± 0.002	0.0185 ± 0.002	0.0199 ± 0.002	0.0193 ± 0.002	0.0195 ± 0.002	0.0172 ± 0.002	0.0186 ± 0.002	0.0221 ± 0.002	0.0189 ± 0.002
12/10/02	0.0177 ± 0.002	0.0191 ± 0.002	0.0168 ± 0.002	0.0198 ± 0.002	0.0186 ± 0.002	0.0152 ± 0.002	0.0168 ± 0.002	0.0201 ± 0.002	0.0148 ± 0.002
12/17/02	0.0105 ± 0.001	0.0105 ± 0.002	0.0102 ± 0.001	0.0150 ± 0.002	0.0110 ± 0.002	0.0130 ± 0.002	0.0133 ± 0.002	0.0117 ± 0.002	0.0097 ± 0.001
12/23/02	0.0151 ± 0.001	0.0161 ± 0.001	0.0119 ± 0.001	0.0163 ± 0.002	0.0190 ± 0.002	0.0168 ± 0.001	0.0129 ± 0.001	0.0147 ± 0.001	0.0144 ± 0.001

* Sample location required by TS/ODCM.
** Optional sample location.

TABLE 6-6

NMPNS/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - ON-SITE STATIONS - 2002

GROSS BETA ACTIVITY pCi/m^3 ± 1 SIGMA

LOCATION

Week Start Date	D1** ON-SITE	G** ON-SITE	H** ON-SITE	I** ON-SITE	J** ON-SITE	K** ON-SITE
12/31/01	0.0205 ± 0.002	0.0155 ± 0.001	0.0196 ± 0.002	0.0191 ± 0.002	0.0185 ± 0.002	0.0173 ± 0.002
01/07/02	0.0166 ± 0.002	0.0167 ± 0.002	0.0140 ± 0.002	0.0210 ± 0.002	0.0153 ± 0.002	0.0165 ± 0.002
01/14/02	0.0164 ± 0.002	0.0120 ± 0.001	0.0147 ± 0.002	0.0154 ± 0.002	0.0143 ± 0.002	0.0109 ± 0.001
01/21/02	0.0212 ± 0.002	0.0202 ± 0.002	0.0204 ± 0.002	0.0214 ± 0.002	0.0210 ± 0.002	0.0203 ± 0.002
01/28/02	0.0161 ± 0.002	0.0186 ± 0.002	0.0170 ± 0.002	0.0165 ± 0.002	0.0159 ± 0.002	0.0154 ± 0.002
02/04/02	0.0235 ± 0.002	0.0261 ± 0.002	0.0249 ± 0.002	0.0248 ± 0.002	0.0224 ± 0.002	0.0216 ± 0.002
02/11/02	0.0160 ± 0.001	0.0145 ± 0.001	0.0150 ± 0.001	0.0157 ± 0.001	0.0142 ± 0.001	0.0146 ± 0.001
02/19/02	0.0145 ± 0.002	0.0138 ± 0.002	0.0171 ± 0.002	0.0135 ± 0.002	0.0150 ± 0.002	0.0112 ± 0.002
02/25/02	0.0171 ± 0.002	0.0155 ± 0.002	0.0163 ± 0.002	0.0161 ± 0.002	0.0175 ± 0.002	0.0148 ± 0.002
03/04/02	0.0232 ± 0.002	0.0199 ± 0.002	0.0199 ± 0.002	0.0189 ± 0.002	0.0190 ± 0.002	0.0177 ± 0.002
03/11/02	0.0233 ± 0.002	0.0210 ± 0.002	0.0180 ± 0.002	0.0199 ± 0.002	0.0197 ± 0.002	0.0189 ± 0.002
03/18/02	0.0117 ± 0.002	0.0114 ± 0.001	0.0118 ± 0.002	0.0129 ± 0.002	0.0104 ± 0.002	0.0102 ± 0.002
03/25/02	0.0162 ± 0.002	0.0154 ± 0.002	0.0146 ± 0.002	0.0131 ± 0.001	0.0149 ± 0.002	0.0145 ± 0.002
04/01/02	0.0153 ± 0.002	0.0140 ± 0.001	0.0142 ± 0.002	0.0160 ± 0.002	0.0157 ± 0.002	0.0183 ± 0.002
04/08/02	0.0175 ± 0.002	0.0125 ± 0.001	0.0149 ± 0.002	0.0127 ± 0.001	0.0133 ± 0.002	0.0179 ± 0.002
04/15/02	0.0187 ± 0.002	0.0213 ± 0.002	0.0179 ± 0.002	0.0188 ± 0.002	0.0182 ± 0.002	0.0177 ± 0.002
04/22/02	0.0143 ± 0.002	0.0153 ± 0.002	0.0140 ± 0.002	0.0157 ± 0.002	0.0148 ± 0.002	0.0130 ± 0.002
04/29/02	0.0104 ± 0.002	0.0112 ± 0.001	0.0120 ± 0.002	0.0125 ± 0.002	0.0128 ± 0.002	0.0123 ± 0.002
05/06/02	0.0135 ± 0.002	0.0108 ± 0.001	0.0135 ± 0.002	0.0124 ± 0.002	0.0122 ± 0.002	0.0135 ± 0.002
05/13/02	0.0090 ± 0.001	0.0108 ± 0.001	0.0109 ± 0.002	0.0077 ± 0.001	0.0073 ± 0.001	0.0089 ± 0.001
05/20/02	0.0093 ± 0.001	0.0103 ± 0.001	0.0119 ± 0.001	0.0087 ± 0.001	0.0106 ± 0.001	0.0079 ± 0.001
05/28/02	0.0122 ± 0.002	0.0144 ± 0.002	0.0169 ± 0.002	0.0190 ± 0.002	0.0143 ± 0.002	0.0180 ± 0.002
06/03/02	0.0094 ± 0.002	0.0105 ± 0.001	0.0119 ± 0.001	0.0090 ± 0.001	0.0114 ± 0.002	0.0101 ± 0.002
06/10/02	0.0092 ± 0.001	0.0103 ± 0.001	0.0068 ± 0.001	0.0067 ± 0.001	0.0085 ± 0.001	0.0080 ± 0.001
06/17/02	0.0149 ± 0.001	0.0202 ± 0.002	0.0166 ± 0.001	0.0178 ± 0.002	0.0164 ± 0.002	0.0155 ± 0.002
06/24/02	0.0168 ± 0.002	0.0162 ± 0.002	0.0169 ± 0.002	0.0173 ± 0.002	0.0214 ± 0.002	0.0194 ± 0.002

** Optional sample location.

TABLE 6-6 (continued)

NMPNS/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - ON-SITE STATIONS - 2002

GROSS BETA ACTIVITY pCi/m^3 ± 1 SIGMA

LOCATION

Week Start Date	D1** ON-SITE	G** ON-SITE	H** ON-SITE	I** ON-SITE	J** ON-SITE	K** ON-SITE
07/01/02	0.0224 ± 0.002	0.0205 ± 0.002	0.0226 ± 0.002	0.0214 ± 0.002	0.0258 ± 0.002	0.0206 ± 0.002
07/08/02	0.0146 ± 0.001	0.0153 ± 0.002	0.0165 ± 0.002	0.0152 ± 0.001	0.0153 ± 0.001	0.0202 ± 0.002
07/15/02	0.0330 ± 0.002	0.0204 ± 0.002	0.0181 ± 0.002	0.0187 ± 0.002	0.0214 ± 0.002	0.0208 ± 0.002
07/22/02	0.0118 ± 0.001	0.0143 ± 0.002	0.0138 ± 0.001	0.0132 ± 0.002	0.0125 ± 0.001	0.0140 ± 0.002
07/29/02	0.0198 ± 0.002	0.0208 ± 0.002	0.0220 ± 0.002	0.0204 ± 0.002	0.0177 ± 0.002	0.0188 ± 0.002
08/05/02	0.0111 ± 0.001	0.0122 ± 0.001	0.0139 ± 0.001	0.0133 ± 0.001	0.0138 ± 0.001	0.0139 ± 0.001
08/12/02	0.0249 ± 0.002	0.0243 ± 0.002	0.0231 ± 0.002	0.0232 ± 0.002	0.0249 ± 0.002	0.0240 ± 0.002
08/19/02	0.0115 ± 0.001	0.0130 ± 0.002	0.0170 ± 0.002	0.0101 ± 0.001	0.0091 ± 0.001	0.0114 ± 0.001
08/26/02	0.0118 ± 0.001	0.0130 ± 0.001	0.0108 ± 0.001	0.0144 ± 0.001	0.0131 ± 0.001	0.0108 ± 0.001
09/03/02	0.0166 ± 0.002	0.0169 ± 0.002	0.0176 ± 0.002	0.0145 ± 0.002	0.0157 ± 0.002	0.0170 ± 0.002
09/09/02	0.0244 ± 0.002	0.0205 ± 0.002	0.0200 ± 0.002	0.0221 ± 0.002	0.0231 ± 0.002	0.0212 ± 0.002
09/16/02	0.0203 ± 0.002	0.0180 ± 0.002	0.0201 ± 0.002	0.0206 ± 0.002	0.0233 ± 0.002	0.0195 ± 0.002
09/23/02	0.0203 ± 0.002	0.0211 ± 0.002	0.0185 ± 0.002	0.0200 ± 0.002	0.0169 ± 0.002	0.0198 ± 0.002
09/30/02	0.0177 ± 0.002	0.0176 ± 0.002	0.0184 ± 0.002	0.0189 ± 0.002	0.0205 ± 0.002	0.0200 ± 0.002
10/07/02	0.0128 ± 0.001	0.0122 ± 0.002	0.0118 ± 0.001	0.0108 ± 0.001	0.0090 ± 0.001	0.0096 ± 0.001
10/14/02	0.0090 ± 0.001	0.0120 ± 0.001	0.0099 ± 0.001	0.0086 ± 0.001	0.0084 ± 0.001	0.0095 ± 0.001
10/21/02	0.0080 ± 0.001	0.0106 ± 0.001	0.0121 ± 0.001	0.0106 ± 0.001	0.0104 ± 0.001	0.0097 ± 0.001
10/28/02	0.0097 ± 0.001	0.0085 ± 0.001	0.0095 ± 0.001	0.0091 ± 0.001	0.0084 ± 0.001	0.0110 ± 0.001
11/04/02	0.0235 ± 0.002	0.0231 ± 0.002	0.0233 ± 0.002	0.0234 ± 0.002	0.0272 ± 0.002	0.0238 ± 0.002
11/12/02	0.0143 ± 0.002	0.0151 ± 0.002	0.0152 ± 0.002	0.0144 ± 0.002	0.0167 ± 0.002	0.0145 ± 0.002
11/18/02	0.0168 ± 0.002	0.0165 ± 0.002	0.0160 ± 0.001	0.0126 ± 0.001	0.0201 ± 0.002	0.0145 ± 0.002
11/25/02	0.0120 ± 0.001	0.0103 ± 0.001	0.0110 ± 0.001	0.0146 ± 0.001	0.0127 ± 0.001	0.0123 ± 0.001
12/02/02	0.0166 ± 0.002	0.0205 ± 0.002	0.0164 ± 0.001	0.0170 ± 0.002	0.0195 ± 0.002	0.0168 ± 0.002
12/09/02	0.0158 ± 0.002	0.0197 ± 0.002	0.0200 ± 0.002	0.0179 ± 0.002	0.0203 ± 0.002	0.0189 ± 0.002
12/16/02	0.0147 ± 0.002	0.0088 ± 0.001	0.0100 ± 0.001	0.0135 ± 0.001	0.0104 ± 0.001	0.0140 ± 0.002
12/23/02	0.0170 ± 0.002	0.0157 ± 0.002	0.0139 ± 0.001	0.0152 ± 0.002	0.0153 ± 0.002	0.0143 ± 0.002

** Optional sample location.

TABLE 6-7

NMPNS/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - OFF-SITE STATIONS - 2002
I-131 ACTIVITY pCi/m^3 ± 1 SIGMA

LOCATION

Week Start Date	R-1* OFF-SITE	R-2* OFF-SITE	R-3* OFF-SITE	R-4* OFF-SITE	R-5* OFF-SITE	D-2** OFF-SITE	E** OFF-SITE	F** OFF-SITE	G** OFF-SITE
01/02/02	< 0.0283	< 0.0283	< 0.0315	< 0.0392	< 0.0280	< 0.0323	< 0.0343	< 0.0394	< 0.0286
01/08/02	< 0.0260	< 0.0235	< 0.0206	< 0.0340	< 0.0290	< 0.0303	< 0.0307	< 0.0182	< 0.0177
01/15/02	< 0.0340	< 0.0270	< 0.0327	< 0.0063	< 0.0181	< 0.0313	< 0.0284	< 0.0056	< 0.0259
01/22/02	< 0.0251	< 0.0262	< 0.0166	< 0.0206	< 0.0331	< 0.0275	< 0.0264	< 0.0304	< 0.0225
01/29/02	< 0.0192	< 0.0200	< 0.0335	< 0.0184	< 0.0249	< 0.0262	< 0.0274	< 0.0276	< 0.0179
02/05/02	< 0.0251	< 0.0154	< 0.0220	< 0.0143	< 0.0226	< 0.0240	< 0.0277	< 0.0225	< 0.0211
02/12/02	< 0.0165	< 0.0230	< 0.0334	< 0.0279	< 0.0307	< 0.0277	< 0.0359	< 0.0217	< 0.0311
02/19/02	< 0.0289	< 0.0291	< 0.0312	< 0.0308	< 0.0340	< 0.0209	< 0.0314	< 0.0054	< 0.0284
02/26/02	< 0.0288	< 0.0200	< 0.0218	< 0.0239	< 0.0290	< 0.0312	< 0.0240	< 0.0306	< 0.0267
03/05/02	< 0.0226	< 0.0247	< 0.0303	< 0.0259	< 0.0211	< 0.0202	< 0.0340	< 0.0270	< 0.0143
03/12/02	< 0.0273	< 0.0246	< 0.0312	< 0.0060	< 0.0205	< 0.0319	< 0.0228	< 0.0187	< 0.0248
03/19/02	< 0.0227	< 0.0264	< 0.0338	< 0.0079	< 0.0281	< 0.0246	< 0.0297	< 0.0249	< 0.0189
03/26/02	< 0.0334	< 0.0232	< 0.0271	< 0.0236	< 0.0368	< 0.0304	< 0.0234	< 0.0307	< 0.0135
04/02/02	< 0.0437	< 0.0276	< 0.0325	< 0.0326	< 0.0229	< 0.0328	< 0.0372	< 0.0195	< 0.0298
04/09/02	< 0.0091	< 0.0199	< 0.0362	< 0.0286	< 0.0349	< 0.0371	< 0.0304	< 0.0258	< 0.0058
04/16/02	< 0.0274	< 0.0238	< 0.0210	< 0.0241	< 0.0392	< 0.0358	< 0.0299	< 0.0276	< 0.0287
04/23/02	< 0.0543	< 0.0245	< 0.0297	< 0.0250	< 0.0342	< 0.0275	< 0.0352	< 0.0358	< 0.0325
04/30/02	< 0.0289	< 0.0262	< 0.0317	< 0.0305	< 0.0419	< 0.0214	< 0.0349	< 0.0174	< 0.0200
05/07/02	< 0.0337	< 0.0147	< 0.0097	< 0.0335	< 0.0293	< 0.0331	< 0.0212	< 0.0197	< 0.0284
05/14/02	< 0.0290	< 0.0236	< 0.0278	< 0.0302	< 0.0236	< 0.0342	< 0.0306	< 0.0286	< 0.0224
05/21/02	< 0.0202	< 0.0163	< 0.0226	< 0.0222	< 0.0220	< 0.0201	< 0.0301	< 0.0272	< 0.0267
05/28/02	< 0.0210	< 0.0233	< 0.0232	< 0.0276	< 0.0260	< 0.0323	< 0.0195	< 0.0375	< 0.0325
06/04/02	< 0.0267	< 0.0298	< 0.0226	< 0.0068	< 0.0329	< 0.0320	< 0.0217	< 0.0175	< 0.0389
06/11/02	< 0.0324	< 0.0256	< 0.0213	< 0.0353	< 0.0238	< 0.0252	< 0.0247	< 0.0286	< 0.0220
06/18/02	< 0.0261	< 0.0262	< 0.0256	< 0.0265	< 0.0240	< 0.0331	< 0.0318	< 0.0283	< 0.0169
06/25/02	< 0.0258	< 0.0256	< 0.0230	< 0.0278	< 0.0233	< 0.0254	< 0.0296	< 0.0358	< 0.0257

* Sample location required by TS/ODCM.
** Optional sample location.

TABLE 6-7 (continued)

NMPNS/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - OFF-SITE STATIONS - 2002
I-131 ACTIVITY pCi/m^3 ± 1 SIGMA

LOCATION

Week Start Date	R-1* OFF-SITE	R-2* OFF-SITE	R-3* OFF-SITE	R-4* OFF-SITE	R-5* OFF-SITE	D-2** OFF-SITE	E** OFF-SITE	F** OFF-SITE	G** OFF-SITE
07/02/02	< 0.0255	< 0.0307	< 0.0237	< 0.0335	< 0.0347	< 0.0060	< 0.0304	< 0.0342	< 0.0315
07/09/02	< 0.0211	< 0.0265	< 0.0270	< 0.0211	< 0.0389	< 0.0331	< 0.0203	< 0.0166	< 0.0243
07/16/02	< 0.0405	< 0.0251	< 0.0295	< 0.0275	< 0.0261	< 0.0361	< 0.0154	< 0.0303	< 0.0167
07/23/02	< 0.0083	< 0.0223	< 0.0312	< 0.0341	< 0.0242	< 0.0244	< 0.0425	< 0.0239	< 0.0235
07/30/02	< 0.0261	< 0.0194	< 0.0293	< 0.0292	< 0.0271	< 0.0296	< 0.0235	< 0.0150	< 0.0284
08/06/02	< 0.0399	< 0.0268	< 0.0150	< 0.0261	< 0.0259	< 0.0282	< 0.0238	< 0.0151	< 0.0248
08/13/02	< 0.0388	< 0.0312	< 0.0194	< 0.0174	< 0.0081	< 0.0228	< 0.0192	< 0.0236	< 0.0213
08/20/02	< 0.0378	< 0.0338	< 0.0270	< 0.0215	< 0.0350	< 0.0082	< 0.0184	< 0.0193	< 0.0239
08/27/02	< 0.0342	< 0.0296	< 0.0253	< 0.0284	< 0.0327	< 0.0315	< 0.0157	< 0.0231	< 0.0245
09/03/02	< 0.0338	< 0.0339	< 0.0280	< 0.0230	< 0.0216	< 0.0372	< 0.0221	< 0.0283	< 0.0256
09/10/02	< 0.0279	< 0.0390	< 0.0301	< 0.0283	< 0.0357	< 0.0261	< 0.0244	< 0.0373	< 0.0335
09/17/02	< 0.0238	< 0.0251	< 0.0158	< 0.0295	< 0.0305	< 0.0278	< 0.0156	< 0.0296	< 0.0290
09/24/02	< 0.0238	< 0.0369	< 0.0513	< 0.0231	< 0.0207	< 0.0316	< 0.0084	< 0.0226	< 0.0224
10/01/02	< 0.0254	< 0.0303	< 0.0233	< 0.0323	< 0.0257	< 0.0279	< 0.0246	< 0.0194	< 0.0164
10/08/02	< 0.0162	< 0.0153	< 0.0203	< 0.0198	< 0.0222	< 0.0272	< 0.0221	< 0.0126	< 0.0191
10/15/02	< 0.0238	< 0.0191	< 0.0171	< 0.0248	< 0.0207	< 0.0278	< 0.0176	< 0.0222	< 0.0195
10/22/02	< 0.0253	< 0.0155	< 0.0203	< 0.0233	< 0.0257	< 0.0180	<0.0108	< 0.0206	< 0.0204
10/29/02	< 0.0133	< 0.0165	< 0.0128	< 0.0191	< 0.0274	< 0.0161	< 0.0127	< 0.0191	< 0.0208
11/05/02	< 0.0199	< 0.0244	< 0.0243	< 0.0238	< 0.0154	< 0.0149	< 0.0163	< 0.0205	< 0.0172
11/12/02	< 0.0219	< 0.0126	< 0.0191	< 0.0235	< 0.0168	< 0.0189	< 0.0195	< 0.0261	< 0.0223
11/19/02	< 0.0133	< 0.0160	< 0.0221	< 0.0191	< 0.0251	< 0.0205	< 0.0141	< 0.0135	< 0.0224
11/26/02	< 0.0166	< 0.0179	< 0.0209	< 0.0239	< 0.0140	< 0.0210	< 0.0177	< 0.0234	< 0.0234
12/03/02	< 0.0140	< 0.0226	< 0.0143	< 0.0246	< 0.0171	< 0.0300	< 0.0161	< 0.0178	< 0.0169
12/10/02	< 0.0177	< 0.0248	< 0.0214	< 0.0161	< 0.0176	< 0.0309	< 0.0138	< 0.0140	< 0.0150
12/17/02	< 0.0233	< 0.0254	< 0.0233	< 0.0229	< 0.0263	< 0.0248	< 0.0298	<0.0244	< 0.0177
12/23/02	< 0.0166	< 0.0188	< 0.0183	< 0.0196	< 0.0205	< 0.0184	< 0.0216	< 0.0162	< 0.0127

* Sample location required by TS/ODCM.
** Optional sample location.

TABLE 6-8

NMPNS/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - ON-SITE STATIONS - 2002

I-131 ACTIVITY pCi/m^3 ± 1 SIGMA

LOCATION

Week Start Date	D1** ON-SITE	G** ON-SITE	H** ON-SITE	I** ON-SITE	J** ON-SITE	K** ON-SITE
12/31/01	< 0.0279	< 0.0270	< 0.0270	< 0.0352	< 0.0303	< 0.0320
01/07/02	< 0.0314	< 0.0239	< 0.0231	< 0.0237	< 0.0193	< 0.0163
01/14/02	< 0.0264	< 0.0298	< 0.0270	< 0.0240	< 0.0257	< 0.0276
01/21/02	< 0.0299	< 0.0219	< 0.0288	< 0.0319	< 0.0279	< 0.0303
01/28/02	< 0.0323	< 0.0262	< 0.0300	< 0.0257	< 0.0173	< 0.0272
02/04/02	< 0.0294	< 0.0237	< 0.0456	< 0.0370	< 0.0429	< 0.0160
02/11/02	< 0.0318	< 0.0143	< 0.0205	< 0.0290	< 0.0286	< 0.0265
02/19/02	< 0.0094	< 0.0234	< 0.0282	< 0.0352	< 0.0329	< 0.0309
02/25/02	< 0.0317	< 0.0227	< 0.0307	< 0.0225	< 0.0259	< 0.0242
03/04/02	< 0.0356	< 0.0198	< 0.0301	< 0.0290	< 0.0338	< 0.0242
03/11/02	< 0.0355	< 0.0274	< 0.0170	< 0.0241	< 0.0199	< 0.0242
03/18/02	< 0.0320	< 0.0230	< 0.0277	< 0.0056	< 0.0314	< 0.0244
03/25/02	< 0.0377	< 0.0303	< 0.0218	< 0.0254	< 0.0224	< 0.0360
04/01/02	< 0.0066	< 0.0215	< 0.0339	< 0.0289	< 0.0246	< 0.0268
04/08/02	< 0.0366	< 0.0249	< 0.0419	< 0.0336	< 0.0285	< 0.0201
04/15/02	< 0.0304	< 0.0285	< 0.0327	< 0.0293	< 0.0238	< 0.0381
04/22/02	< 0.0084	< 0.0229	< 0.0417	< 0.0210	< 0.0356	< 0.0217
04/29/02	< 0.0316	< 0.0331	< 0.0343	< 0.0184	< 0.0165	< 0.0206
05/06/02	< 0.0228	< 0.0136	< 0.0359	< 0.0295	< 0.0327	< 0.0246
05/13/02	< 0.0255	< 0.0282	< 0.0371	< 0.0297	< 0.0279	< 0.0273
05/20/02	< 0.0344	< 0.0167	< 0.0211	< 0.0287	< 0.0150	< 0.0203
05/28/02	< 0.0203	< 0.0343	< 0.0216	< 0.0358	< 0.0115	< 0.0278
06/03/02	< 0.0325	< 0.0204	< 0.0274	< 0.0234	< 0.0208	< 0.0376
06/10/02	< 0.0400	< 0.0296	< 0.0227	< 0.0254	< 0.0240	< 0.0271
06/17/02	< 0.0184	< 0.0313	< 0.0230	< 0.0289	< 0.0290	< 0.0200
06/24/02	< 0.0168	< 0.0247	< 0.0293	< 0.0300	< 0.0195	< 0.0348

** Optional sample location.

TABLE 6-8 (continued)

NMPNS/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - ON-SITE STATIONS - 2002
I-131 ACTIVITY pCi/m^3 ± 1 SIGMA

LOCATION

Week Start Date	D1** ON-SITE	G** ON-SITE	H** ON-SITE	I** ON-SITE	J** ON-SITE	K** ON-SITE
07/01/02	< 0.0265	< 0.0270	< 0.0199	< 0.0343	< 0.0318	< 0.0194
07/08/02	< 0.0286	< 0.0167	< 0.0157	< 0.0260	< 0.0271	< 0.0217
07/15/02	< 0.0212	< 0.0209	< 0.0226	< 0.0263	< 0.0289	< 0.0246
07/22/02	< 0.0232	< 0.0383	< 0.0060	< 0.0222	< 0.0351	< 0.0349
07/29/02	< 0.0334	< 0.0247	< 0.0259	< 0.0159	< 0.0283	< 0.0059
08/05/02	< 0.0288	< 0.0254	< 0.0268	< 0.0264	< 0.0234	< 0.0280
08/12/02	< 0.0294	< 0.0300	< 0.0219	< 0.0213	< 0.0209	< 0.0262
08/19/02	< 0.0313	< 0.0276	< 0.0302	< 0.0286	< 0.0240	< 0.0264
08/26/02	< 0.0266	< 0.0287	< 0.0272	< 0.0253	< 0.0352	< 0.0267
09/03/02	< 0.0448	< 0.0271	< 0.0237	< 0.0374	< 0.0094	< 0.0378
09/09/02	< 0.0284	< 0.0270	< 0.0266	< 0.0323	< 0.0270	< 0.0206
09/16/02	< 0.0307	< 0.0211	< 0.0247	< 0.0261	< 0.0170	< 0.0293
09/23/02	< 0.0328	< 0.0232	< 0.0304	< 0.0348	< 0.0194	< 0.0325
09/30/02	< 0.0285	< 0.0219	< 0.0308	< 0.0146	< 0.0343	< 0.0254
10/07/02	< 0.0264	< 0.0208	< 0.0207	< 0.0142	< 0.0168	< 0.0186
10/14/02	< 0.0249	< 0.0187	< 0.0240	< 0.0122	< 0.0161	< 0.0197
10/21/02	< 0.0172	< 0.0176	< 0.0184	< 0.0181	< 0.0183	< 0.0228
10/28/02	< 0.0263	< 0.0205	< 0.0135	< 0.0227	< 0.0246	< 0.0236
11/04/02	< 0.0165	< 0.0143	< 0.0174	< 0.0161	< 0.0161	< 0.0252
11/12/02	< 0.0282	< 0.0153	< 0.0214	< 0.0262	< 0.0173	< 0.0292
11/18/02	< 0.0221	< 0.0206	< 0.0160	< 0.0205	< 0.0181	< 0.0210
11/25/02	< 0.0226	< 0.0122	< 0.0193	< 0.0238	< 0.0173	< 0.0152
12/02/02	< 0.0213	< 0.0122	< 0.0161	< 0.0120	< 0.0202	< 0.0178
12/09/02	< 0.0310	< 0.0184	< 0.0183	< 0.0185	< 0.0252	< 0.0149
12/16/02	< 0.0199	< 0.0243	< 0.0174	< 0.0211	< 0.0220	< 0.0227
12/23/02	< 0.0203	< 0.0169	< 0.0158	< 0.0245	< 0.0192	< 0.0243

** Optional sample location.

TABLE 6-9

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

R1 OFF-SITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	94.9 ± 21.9	129 ± 22.7	57.7 ± 14.1	99.6 ± 20.1	94.2 ± 18.5	130 ± 25.7
Zn-65	<13.8	<10.7	<4.14	<13.8	<9.75	<16.4
Cs-134	<5.49	<0.95	<2.90	<6.14	<3.33	<4.98
Cs-137	<4.38	<3.90	<2.41	<3.74	<3.45	<3.47
Zr-95	<9.45	<6.61	<6.23	<9.82	<6.32	<9.84
Nb-95	<6.67	<6.16	<5.62	<4.30	<3.84	<7.40
Co-58	<8.08	<5.57	<3.62	<6.42	<1.01	<4.43
Mn-54	<4.60	<4.62	<2.41	<6.17	<4.24	<4.39
Co-60	<1.76	<5.53	<4.59	<5.59	<4.37	<6.07
K-40	86.3 ± 31.4	<58.7	<12.9	<63.2	<46.5	<17.2
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	91.5 ± 20.2	114 ± 17.4	118 ± 13.6	40.7 ± 12.8	61.7 ± 10.2	52.1 ± 11.3
Zn-65	<2.99	<10.5	<6.51	<8.06	<3.75	<5.14
Cs-134	<0.96	<3.43	<2.45	<2.59	<1.58	<2.40
Cs-137	<4.85	<3.79	<1.46	<1.64	<1.79	<2.12
Zr-95	<8.18	<7.89	<4.28	<5.37	<4.97	<5.46
Nb-95	<6.44	<3.32	<3.57	<4.20	<3.01	<3.48
Co-58	<4.23	<2.77	<2.14	<4.68	<2.89	<2.79
Mn-54	<4.66	<2.98	<2.15	<2.27	<1.18	<2.22
Co-60	<6.49	<3.52	<0.77	<0.83	<3.19	<3.46
K-40	<59.8	<12.5	<7.82	<28.8	<17.9	<8.33
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample location required by TS/ODCM.
H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

R2 OFF-SITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	78.0 ± 18.5	112 ± 19.1	66.5 ± 16.1	98.7 ± 22.1	92.4 ± 15.2	101 ± 20.0
Zn-65	<15.1	<9.15	<16.6	<3.67	<5.87	<7.37
Cs-134	<2.53	<4.44	<3.77	<4.52	<2.97	<5.29
Cs-137	<3.61	<3.50	<2.62	<4.92	<3.21	<3.54
Zr-95	<7.86	<7.74	<7.53	<7.15	<6.04	<5.95
Nb-95	<3.83	<3.81	<5.22	<4.84	<4.12	<4.75
Co-58	<4.56	<4.49	<4.78	<4.44	<2.43	<5.23
Mn-54	<3.83	<4.41	<4.06	<6.40	<2.77	<4.47
Co-60	<4.44	<5.47	<4.59	<2.14	<1.24	<3.46
K-40	<15.9	<61.1	65.1 ± 21.1	<62.6	<12.6	119 ± 23.7
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	102 ± 17.3	45.9 ± 15.6	117 ± 16.4	72.8 ± 12.5	70.1 ± 12.5	61.3 ± 10.8
Zn-65	<7.20	<10.9	<7.95	<5.04	<8.67	<6.91
Cs-134	<4.45	<3.39	<2.98	<2.81	<2.47	<3.37
Cs-137	<3.02	<0.96	<3.00	<2.54	<2.61	<2.01
Zr-95	<7.44	<10.0	<5.50	<5.56	<1.32	<7.05
Nb-95	<5.71	<5.99	<3.75	<2.64	<3.36	<4.99
Co-58	<4.82	<3.96	<2.63	<2.47	<4.62	<3.22
Mn-54	<3.93	<4.27	<2.77	<3.03	<2.40	<2.55
Co-60	<1.52	<7.72	<4.08	<3.01	<1.03	<3.84
K-40	<61.5	<53.4	98.8 ± 21.2	<29.0	<10.6	61.5 ± 13.7
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample location required by TS/ODCM.
H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

R3 OFF-SITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	77.9 ± 17.1	96.9 ± 19.0	52.9 ± 16.4	138 ± 21.1	116 ± 17.0	105 ± 18.8
Zn-65	<7.62	<13.5	<16.6	<8.10	<5.53	<9.34
Cs-134	<4.05	<4.03	<3.96	<2.50	<0.67	<2.86
Cs-137	<4.87	<2.37	<2.63	<4.24	<2.56	<4.19
Zr-95	<7.92	<9.28	<6.46	<8.91	<7.95	<8.24
Nb-95	<6.50	<5.70	<4.49	<5.92	<4.44	<1.33
Co-58	<6.53	<3.64	<5.91	<3.97	<3.78	<4.23
Mn-54	<5.01	<3.02	<3.40	<2.75	<0.76	<3.14
Co-60	<7.47	<4.50	<7.88	<5.37	<1.16	<4.86
K-40	<58.2	<45.6	<54.5	<45.3	<33.6	<15.1
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	131 ± 19.1	95.8 ± 17.0	96.4 ± 12.7	67.2 ± 11.8	67.1 ± 9.96	60.7 ± 11.7
Zn-65	<6.61	<8.69	<5.82	<4.64	<4.89	<8.19
Cs-134	<3.85	<3.47	<3.85	<2.94	<1.95	<3.96
Cs-137	<3.41	<2.73	<2.00	<2.60	<2.16	<3.21
Zr-95	<8.74	<4.51	<6.09	<3.86	<4.19	<6.28
Nb-95	<4.63	<4.08	<4.15	<3.92	<3.53	<4.05
Co-58	<3.07	<3.42	<2.72	<2.91	<2.51	<3.31
Mn-54	<0.91	<2.89	<3.24	<2.84	<1.82	<2.67
Co-60	<1.39	<4.48	<3.68	<3.21	<2.81	<4.11
K-40	<50.9	<12.0	102 ± 16.5	49.3 ± 14.0	<18.4	108 ± 18.6
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample location required by TS/ODCM.
H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

R4 OFF-SITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	79.7 ± 21.3	146 ± 25.7	109 ± 17.4	116 ± 20.1	95.3 ± 17.8	152 ± 22.1
Zn-65	<8.30	<15.1	<12.8	<7.49	<9.41	<7.46
Cs-134	<4.48	<3.49	<3.29	<5.33	<2.88	<4.60
Cs-137	<3.96	<4.08	<2.26	<4.11	<2.78	<3.64
Zr-95	<10.4	<8.93	<7.54	<5.25	<6.06	<7.71
Nb-95	<7.33	<7.12	<4.86	<3.55	<1.21	<7.37
Co-58	<6.58	<5.18	<3.71	<4.95	<4.09	<5.45
Mn-54	<3.91	<4.30	<3.94	<3.53	<4.29	<3.51
Co-60	<4.91	<16.4	<4.12	<4.52	<3.83	<5.68
K-40	<63.2	113 ± 31.9	<28.2	<44.0	<49.5	<16.0
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	110 ± 22.0	89.1 ± 15.9	85.4 ± 14.8	54.2 ± 12.8	73.0 ± 10.8	75.0 ± 13.6
Zn-65	<11.0	<8.61	<10.8	<8.77	<5.31	<7.43
Cs-134	<4.09	<2.96	<4.06	<3.74	<2.55	<2.84
Cs-137	<4.24	<3.20	<2.68	<2.82	<1.36	<2.35
Zr-95	<9.23	<5.32	<7.67	<7.18	<4.70	<6.58
Nb-95	<6.36	<6.26	<4.68	<4.56	<2.62	<4.40
Co-58	<5.37	<2.47	<2.72	<3.70	<2.57	<4.12
Mn-54	<6.38	<2.77	<3.88	<2.02	<1.77	<2.69
Co-60	<6.61	<3.52	<3.67	<4.56	<1.95	<2.37
K-40	<57.9	<34.2	<55.4	89.2 ± 19.1	<18.9	<9.24
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample location required by TS/ODCM.
H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} $pCi/m^3 \pm 1$ Sigma

R5 OFF-SITE COMPOSITE (CONTROL)*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	104 ± 19.6	106 ± 25.6	109 ± 16.9	119 ± 21.4	100 ± 16.4	108 ± 19.6
Zn-65	<10.5	<3.91	<11.6	<9.45	<8.35	<10.5
Cs-134	<3.40	<4.11	<3.71	<4.02	<4.71	<3.84
Cs-137	<4.67	<3.15	<0.74	<5.86	<3.46	<2.87
Zr-95	<10.1	<2.94	<7.66	<5.89	<4.78	<5.76
Nb-95	<1.56	<7.21	<5.69	<1.38	<4.95	<5.04
Co-58	<4.83	<7.29	<2.71	<5.07	<3.58	<3.35
Mn-54	<4.05	<6.06	<3.34	<1.04	<4.46	<4.73
Co-60	<1.65	<6.40	<1.36	<1.58	<2.79	<4.30
K-40	<57.6	<83.0	<55.2	101 ± 24.5	71.9 ± 19.4	<43.7
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	122 ± 22.2	94.3 ± 16.2	110 ± 13.2	65.3 ± 12.6	81.6 ± 11.2	70.8 ± 12.0
Zn-65	<10.9	<8.09	<6.22	<6.58	<5.15	<7.12
Cs-134	<4.13	<2.94	<3.33	<3.53	<2.33	<2.47
Cs-137	<3.00	<2.54	<2.60	<2.45	<1.90	<2.19
Zr-95	<7.12	<4.47	<5.23	<6.33	<3.24	<6.30
Nb-95	<4.90	<5.13	<2.82	<4.34	<2.61	<3.88
Co-58	<4.50	<3.30	<3.34	<3.51	<1.48	<3.67
Mn-54	<4.14	<2.20	<2.71	<2.90	<2.44	<2.44
Co-60	<5.70	<3.29	<3.92	<2.64	<3.10	<0.85
K-40	75.7 ± 22.2	<11.7	<34.4	109 ± 18.6	42.0 ± 10.2	<8.59
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample location required by TS/ODCM.
H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

D2-OFF-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	122 ± 19.9	179 ± 23.3	84.1 ± 18.4	136 ± 22.3	92.3 ± 17.4	124 ± 23.9
Zn-65	<2.81	<13.4	<22.9	<10.5	<9.74	<15.7
Cs-134	<4.78	<3.14	<4.91	<4.16	<4.44	<4.76
Cs-137	<3.51	<3.76	<4.06	<4.03	<2.95	<4.85
Zr-95	<7.95	<2.21	<7.72	<12.5	<10.4	<8.43
Nb-95	<4.42	<6.61	<6.22	<7.97	<7.10	<7.61
Co-58	<1.26	<4.82	<4.81	<5.25	<4.40	<4.91
Mn-54	<3.04	<3.46	<6.27	<3.94	<13.2	<5.12
Co-60	<1.60	<4.24	<5.05	<7.35	<2.08	<4.57
K-40	<16.2	<65.6	<18.1	159 ± 32.5	<60.5	<46.5
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	146 ± 21.3	102 ± 19.8	94.5 ± 14.3	40.5 ± 12.7	41.9 ± 11.8	75.4 ± 12.2
Zn-65	<9.18	<3.26	<1.49	<6.04	<8.46	<5.61
Cs-134	<5.15	<4.02	<3.04	<3.52	<3.34	<2.98
Cs-137	<3.55	<2.67	<2.94	<2.23	<2.33	<2.33
Zr-95	<5.18	<6.94	<5.03	<4.41	<6.14	<7.02
Nb-95	<4.48	<4.83	<4.14	<3.83	<4.27	<4.31
Co-58	<5.31	<5.15	<2.09	<4.11	<3.92	<3.20
Mn-54	<3.42	<3.44	<3.08	<1.54	<2.34	<2.76
Co-60	<1.53	<5.35	<3.09	<3.12	<4.73	<3.39
K-40	<42.4	<19.2	<29.8	<38.9	<29.3	51.5 ± 12.5
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location.

H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

E OFF-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	57.4 ± 21.2	110 ± 20.4	70.2 ± 15.0	124 ± 23.5	83.3 ± 17.3	98.4 ± 23.7
Zn-65	<15.6	<15.4	<20.0	<10.6	<10.5	<11.8
Cs-134	<5.07	<5.28	<3.34	<5.22	<4.20	<6.31
Cs-137	<3.75	<4.32	<2.48	<4.06	<2.25	<3.54
Zr-95	<11.0	<7.40	<7.47	<11.3	<7.92	<7.70
Nb-95	<1.74	<5.29	<4.45	<6.28	<5.79	<4.75
Co-58	<7.47	<6.47	<2.93	<6.19	<4.07	<6.47
Mn-54	<6.26	<4.87	<3.68	<3.83	<4.25	<4.76
Co-60	<7.63	<4.76	<1.31	<3.83	<1.43	<3.46
K-40	144 ± 31.5	<46.2	<48.1	132 ± 25.9	<39.6	120 ± 26.9
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	141 ± 19.9	76.7 ± 13.1	111 ± 13.2	67.6 ± 12.6	76.7 ± 11.2	75.9 ± 12.9
Zn-65	<6.96	<7.65	<6.62	<5.00	<5.65	<5.72
Cs-134	<3.33	<1.85	<2.63	<2.29	<2.02	<3.68
Cs-137	<3.91	<3.93	<2.26	<2.37	<2.36	<3.80
Zr-95	<7.07	<1.60	<4.36	<5.93	<2.62	<5.50
Nb-95	<6.93	<3.62	<2.01	<5.65	<3.47	<4.99
Co-58	<3.24	<3.89	<3.34	<3.14	<1.37	<3.63
Mn-54	<3.52	<2.96	<3.07	<2.60	<1.87	<2.51
Co-60	<4.16	<5.11	<2.23	<2.98	<2.25	<2.98
K-40	<42.2	<59.5	<28.7	<23.8	37.4 ± 11.6	125 ± 22.3
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Options sample location.
H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

F OFF-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	<40.2	154 ± 20.7	53.6 ± 18.1	117 ± 25.9	73.9 ± 15.7	96.6 ± 18.9
Zn-65	<10.2	<14.3	<11.4	<9.98	<5.98	<6.73
Cs-134	<3.11	<3.32	<3.78	<3.90	<3.98	<2.78
Cs-137	<5.21	<2.75	<3.43	<1.11	<1.98	<2.13
Zr-95	<7.96	<9.55	<9.45	<7.15	<1.64	<6.85
Nb-95	<7.04	<6.10	<4.05	<6.11	<4.20	<6.71
Co-58	<4.74	<6.51	<3.94	<6.56	<2.47	<4.63
Mn-54	<4.40	<3.52	<3.34	<4.91	<3.27	<0.93
Co-60	<4.20	<7.46	<3.63	<7.74	<4.56	<5.11
K-40	<44.4	<14.7	69.2 ± 21.9	<22.0	<34.9	56.2 ± 19.8
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	65.0 ± 18.9	109 ± 16.7	87.5 ± 15.0	61.3 ± 13.8	46.6 ± 9.84	70.6 ± 11.2
Zn-65	<14.1	<2.05	<9.49	<9.20	<4.59	<5.22
Cs-134	<4.83	<3.14	<3.00	<3.33	<2.34	<3.13
Cs-137	<2.76	<1.83	<2.10	<2.10	<1.31	<2.70
Zr-95	<9.86	<4.02	<5.31	<7.13	<4.27	<5.58
Nb-95	<3.81	<2.80	<2.98	<3.67	<2.97	<3.58
Co-58	<4.07	<2.93	<4.28	<3.73	<1.90	<2.61
Mn-54	<4.91	<2.08	<3.55	<2.47	<2.52	<2.64
Co-60	<5.57	<1.17	<3.52	<3.53	<2.38	<3.50
K-40	126 ± 29.2	<32.4	<47.1	62.6 ± 18.0	<18.2	59.2 ± 16.6
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location.

H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

G OFF-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	67.8 ± 15.8	120 ± 20.6	75.4 ± 14.6	91.3 ± 18.6	88.3 ± 16.1	103 ± 20.6
Zn-65	<9.45	<12.8	<9.56	<10.5	<6.71	<2.71
Cs-134	<4.76	<2.05	<3.30	<3.91	<3.76	<4.83
Cs-137	<0.74	<2.86	<2.88	<3.33	<2.46	<4.89
Zr-95	<7.85	<9.26	<8.73	<6.72	<6.26	<10.6
Nb-95	<5.58	<6.61	<4.82	<5.66	<2.89	<4.82
Co-58	<3.91	<3.80	<3.21	<2.78	<2.46	<3.22
Mn-54	<3.26	<4.79	<3.96	<2.42	<2.69	<4.91
Co-60	<3.83	<6.50	<3.98	<4.71	<4.70	<5.57
K-40	<49.1	87.4 ± 23.3	90.1 ± 19.3	<50.2	<32.3	120 ± 28.6
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	133 ± 21.1	95.2 ± 16.3	109 ± 14.1	52.4 ± 11.6	68.0 ± 10.7	62.6 ± 12.5
Zn-65	<9.55	<8.09	<7.45	<5.68	<6.31	<6.42
Cs-134	<3.66	<0.66	<4.18	<4.31	<2.06	<3.51
Cs-137	<3.51	<2.84	<2.90	<2.66	<1.98	<1.65
Zr-95	<10.3	<8.08	<5.33	<6.60	<4.51	<4.03
Nb-95	<5.34	<4.59	<3.64	<3.41	<0.60	<3.07
Co-58	<4.11	<3.30	<3.49	<3.10	<2.82	<2.62
Mn-54	<3.51	<2.20	<1.92	<2.28	<1.82	<3.33
Co-60	<1.17	<4.86	<0.64	<2.21	<2.72	<3.01
K-40	117 ± 23.9	<42.4	106 ± 18.5	86.3 ± 14.4	53.3 ± 11.4	<8.46
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location.

H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

D1 ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	60.7 ± 14.4	108 ± 24.2	84.5 ± 16.9	123 ± 24.1	116 ± 22.3	118 ± 20.4
Zn-65	<14.1	<8.18	<16.4	<16.0	<3.52	<2.68
Cs-134	<5.13	<5.30	<3.34	<5.75	<4.85	<3.89
Cs-137	<4.39	<5.10	<2.57	<3.62	<5.15	<3.75
Zr-95	<8.96	<10.4	<8.06	<9.01	<7.02	<9.71
Nb-95	<6.40	<6.72	<7.31	<7.43	<4.84	<6.75
Co-58	<5.18	<3.70	<5.02	<4.53	<6.42	<3.41
Mn-54	<3.70	<4.97	<1.16	<3.12	<4.72	<4.28
Co-60	<4.34	<1.70	<1.83	<1.77	<5.79	<1.53
K-40	<44.0	126 ± 30.3	<53.4	<74.9	<59.2	91.6 ± 22.9
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	99.1 ± 24.9	110 ± 21.2	123 ± 19.3	82.9 ± 13.9	47.9 ± 12.8	67.4 ± 13.1
Zn-65	<24.0	<12.0	<7.12	<6.23	<7.04	<9.62
Cs-134	<5.37	<4.16	<4.03	<2.63	<2.44	<2.32
Cs-137	<6.12	<4.04	<4.26	<2.17	<2.36	<3.65
Zr-95	<10.5	<9.54	<7.28	<6.01	<4.82	<5.76
Nb-95	<5.75	<7.45	<6.47	<4.80	<5.18	<4.58
Co-58	<6.13	<4.79	<4.25	<3.05	<3.66	<4.39
Mn-54	<1.43	<4.72	<4.74	<2.70	<2.37	<3.39
Co-60	<2.25	<6.30	<5.44	<2.19	<1.02	<3.58
K-40	<23.0	<50.7	<15.3	<29.3	<5.34	<36.6
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location.

H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

G ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	59.5 ± 16.3	144 ± 25.5	91.7 ± 15.2	105 ± 20.7	88.7 ± 16.8	136 ± 23.3
Zn-65	<12.1	<3.69	<11.4	<8.36	<7.96	<12.8
Cs-134	<4.80	<4.48	<0.68	<6.07	<2.82	<4.84
Cs-137	<3.83	<3.75	<2.41	<3.33	<1.98	<5.63
Zr-95	<8.38	<7.60	<5.27	<9.94	<4.76	<10.5
Nb-95	<6.68	<8.02	<4.75	<6.36	<2.95	<7.88
Co-58	<4.19	<5.95	<3.54	<5.12	<3.61	<5.03
Mn-54	<4.50	<4.92	<2.16	<2.90	<2.67	<4.28
Co-60	<1.54	<2.12	<5.10	<4.97	<3.29	<4.65
K-40	<15.7	<61.6	<42.3	109 ± 24.5	<34.9	<69.6
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	111 ± 21.4	104 ± 16.7	142 ± 24.3	63.4 ± 12.8	73.5 ± 10.8	60.7 ± 11.4
Zn-65	<10.2	<6.24	<14.5	<6.67	<6.48	<5.91
Cs-134	<3.63	<3.67	<5.86	<2.82	<1.96	<2.93
Cs-137	<4.59	<2.49	<5.70	<2.92	<1.89	<1.87
Zr-95	<2.14	<1.66	<8.83	<5.89	<5.01	<6.61
Nb-95	<4.83	<3.77	<9.95	<4.90	<3.61	<3.93
Co-58	<3.22	<3.14	<7.64	<2.69	<2.54	<2.55
Mn-54	<3.97	<2.12	<1.55	<3.25	<1.83	<2.57
Co-60	<5.32	<3.27	<7.00	<2.95	<1.75	<2.11
K-40	<44.8	<43.6	<71.6	<40.5	<32.9	65.9 ± 15.1
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location.

H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

H ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	86.0 ± 16.9	107 ± 23.4	111 ± 21.0	94.9 ± 22.9	103 ± 16.1	126 ± 19.4
Zn-65	<7.23	<13.7	<15.6	<15.4	<7.80	<11.5
Cs-134	<3.83	<3.21	<3.54	<5.36	<4.37	<5.68
Cs-137	<2.26	<3.29	<3.90	<3.24	<2.04	<3.56
Zr-95	<7.59	<6.56	<10.2	<11.3	<6.40	<6.83
Nb-95	<4.27	<6.86	<6.24	<5.44	<5.35	<5.56
Co-58	<3.46	<4.29	<3.66	<6.06	<3.22	<5.22
Mn-54	<3.65	<4.55	<3.09	<6.18	<3.37	<3.93
Co-60	<4.28	<6.28	<6.39	<7.60	<3.71	<5.41
K-40	<15.2	<45.7	<39.4	<18.6	<52.6	91.6 ± 25.3
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	133 ± 19.9	114 ± 16.1	81.3 ± 17.6	84.0 ± 13.8	56.0 ± 9.53	63.6 ± 11.6
Zn-65	<8.32	<7.65	<12.4	<6.16	<4.48	<5.75
Cs-134	<3.71	<3.22	<2.92	<3.12	<2.03	<3.15
Cs-137	<3.92	<1.72	<3.02	<2.48	<1.95	<2.42
Zr-95	<5.94	<4.74	<7.14	<5.04	<4.95	<4.02
Nb-95	<1.27	<5.30	<4.99	<4.25	<2.25	<3.00
Co-58	<4.44	<0.85	<3.70	<1.81	<2.27	<2.56
Mn-54	<2.46	<0.72	<3.20	<2.29	<2.33	<2.69
Co-60	<3.95	<1.10	<3.96	<4.85	<2.70	<3.13
K-40	<3.83	<38.3	<15.4	<43.1	<6.52	<20.6
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location.

H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

I ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	78.3 ± 17.7	84.8 ± 18.5	80.3 ± 15.6	67.4 ± 18.7	107 ± 16.5	103 ± 20.6
Zn-65	<17.2	<9.06	<11.1	<12.6	<7.20	<13.4
Cs-134	<3.75	<5.51	<3.53	<4.88	<3.58	<4.47
Cs-137	<2.24	<0.82	<2.59	<3.88	<3.45	<3.26
Zr-95	<11.3	<8.84	<6.79	<10.6	<5.81	<7.90
Nb-95	<7.50	<7.12	<4.09	<7.84	<5.21	<5.64
Co-58	<5.00	<5.11	<3.39	<5.22	<3.38	<4.08
Mn-54	<4.63	<5.15	<3.32	<4.20	<3.35	<3.47
Co-60	<7.38	<1.49	<1.18	<5.07	<3.41	<4.28
K-40	<45.4	<54.5	<34.1	<62.6	<12.2	<57.1
OtherH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	136 ± 20.8	58.7 ± 15.8	108 ± 18.3	66.3 ± 13.1	59.9 ± 10.4	71.2 ± 10.5
Zn-65	<8.96	<6.82	<9.16	<7.55	<1.11	<5.84
Cs-134	<3.79	<2.88	<2.49	<2.75	<1.75	<2.78
Cs-137	<4.28	<2.48	<2.41	<2.35	<1.93	<2.17
Zr-95	<10.3	<5.57	<7.42	<4.19	<5.09	<5.53
Nb-95	<7.74	<3.88	<5.06	<4.04	<3.11	<4.03
Co-58	<3.32	<3.23	<3.75	<2.16	<2.57	<2.45
Mn-54	<5.10	<2.73	<3.42	<2.49	<1.77	<2.36
Co-60	<1.49	<5.30	<4.37	<3.83	<2.28	<3.16
K-40	<15.1	<32.6	<42.5	<33.6	<32.8	<21.8
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location.
H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

J ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	59.5 ± 16.3	144 ± 23.3	56.5 ± 14.6	136 ± 23.5	101 ± 17.9	123 ± 22.2
Zn-65	<9.85	<15.1	<11.1	<12.9	<9.54	<10.1
Cs-134	<4.15	<4.22	<3.52	<5.67	<4.04	<4.49
Cs-137	<4.37	<2.89	<3.34	<4.46	<3.41	<3.34
Zr-95	<6.85	<10.0	<6.31	<10.4	<1.80	<9.25
Nb-95	<5.66	<9.02	<1.21	<4.97	<5.52	<6.43
Co-58	<5.57	<5.20	<4.19	<5.54	<4.66	<5.38
Mn-54	<3.30	<3.70	<3.17	<4.82	<0.90	<3.75
Co-60	<1.55	<6.81	<1.29	<5.98	<3.88	<6.06
K-40	<54.1	<59.4	<35.6	<48.0	<71.0	<17.1
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	99.0 ± 19.8	97.7 ± 19.3	113 ± 14.7	76.0 ± 12.9	46.1 ± 11.3	59.8 ± 12.3
Zn-65	<13.4	<3.05	<1.52	<5.68	<6.86	<8.13
Cs-134	<4.67	<4.58	<2.88	<3.42	<2.37	<3.69
Cs-137	<4.51	<2.49	<2.47	<2.09	<2.06	<2.89
Zr-95	<8.35	<9.63	<4.14	<5.44	<6.11	<5.98
Nb-95	<8.09	<7.52	<2.91	<3.65	<3.29	<4.09
Co-58	<4.85	<3.80	<3.23	<3.15	<3.57	<3.72
Mn-54	<4.13	<3.22	<2.37	<2.77	<2.31	<3.21
Co-60	<5.68	<6.35	<2.86	<2.92	<4.66	<4.07
K-40	103 ± 30.2	<17.9	69.5 ± 19.1	<32.6	<36.6	96.5 ± 18.4
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location.

H Plant related radionuclides.

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2002

Results in Units of 10^{-3} pCi/m^3 ± 1 Sigma

K ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	62.6 ± 16.7	117 ± 23.8	69.6 ± 15.8	87.7 ± 18.8	90.5 ± 15.1	156 ± 21.2
Zn-65	<12.7	<18.1	<13.2	<11.6	<10.5	<7.45
Cs-134	<5.18	<3.92	<4.98	<6.55	<3.92	<4.97
Cs-137	<4.68	<3.01	<3.37	<3.21	<3.59	<4.50
Zr-95	<8.77	<2.84	<9.56	<7.91	<5.54	<8.88
Nb-95	<5.63	<7.02	<5.76	<6.71	<5.32	<6.90
Co-58	<3.15	<4.76	<4.76	<3.53	<4.96	<3.49
Mn-54	<4.22	<3.93	<3.75	<3.56	<3.05	<4.90
Co-60	<5.56	<6.12	<4.17	<5.25	<3.49	<1.56
K-40	<53.5	<79.3	94.6 ± 23.9	165 ± 27.9	93.3 ± 20.1	<66.6
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	138 ± 20.1	64.2 ± 15.1	130 ± 14.6	56.1 ± 12.5	55.0 ± 10.4	53.1 ± 14.8
Zn-65	<10.5	<8.82	<7.18	<3.84	<6.24	<10.6
Cs-134	<5.15	<2.32	<2.86	<2.22	<2.62	<4.19
Cs-137	<4.02	<3.65	<2.59	<1.75	<1.96	<3.45
Zr-95	<11.0	<1.60	<3.59	<6.63	<4.82	<6.76
Nb-95	<4.55	<1.11	<4.37	<4.16	<2.96	<6.86
Co-58	<2.59	<3.48	<3.54	<2.73	<2.80	<3.40
Mn-54	<3.91	<2.94	<2.46	<2.25	<1.89	<3.82
Co-60	<5.79	<3.13	<3.08	<3.34	<2.63	<3.61
K-40	102 ± 21.4	<33.1	<23.6	<29.2	<24.2	<13.0
OthersH	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location.

H Plant related radionuclides.

TABLE 6-10

DIRECT RADIATION MEASUREMENT RESULTS - 2002

Results in Units of mrem/std. Month ± 1 Sigma

LOCATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)(1)
3	D1 On-site	13.6 ± 0.5	12.3 ± 0.6	12.6 ± 0.8	9.8 ± 0.5	0.2 miles @ 69^o
4	D2 On-site	5.4 ± 0.3	4.8 ± 0.2	5.0 ± 0.1	3.9 ± 0.3	0.4 miles @ 140^o
5	E On-site	5.5 ± 0.3	4.7 ± 0.4	5.0 ± 0.3	3.9 ± 0.2	0.4 miles @ 175^o
6	F On-site	4.2 ± 0.1	3.7 ± 0.3	4.5 ± 0.2	3.6 ± 0.2	0.5 miles @ 210^o
7*	G On-site	4.8 ± 0.2	4.8 ± 0.4	3.9 ± 0.1	3.5 ± 0.2	0.7 miles @ 250^o
8	R-5 Off-site Control	5.4 ± 0.3	4.2 ± 0.3	5.5 ± 0.2	4.5 ± 0.3	16.4 miles @ 42^o
9	D1 Off-site	4.9 ± 0.4	3.6 ± 0.4	4.4 ± 0.3	3.7 ± 0.3	11.4 miles @ 80^o
10	D2 Off-site	4.8 ± 0.2	4.4 ± 0.1	4.6 ± 0.2	3.9 ± 0.1	9.0 miles @ 117^o
11	E Off-site	5.0 ± 0.2	3.9 ± 0.1	4.6 ± 0.5	3.6 ± 0.2	7.2 miles @ 160^o
12	F Off-site	4.9 ± 0.3	4.1 ± 0.1	4.3 ± 0.2	3.9 ± 0.2	7.7 miles @ 190^o
13	G Off-site	4.9 ± 0.3	4.3 ± 0.1	4.6 ± 0.5	3.8 ± 0.2	5.3 miles @ 225^o
14*	DeMass Rd., SW Oswego –Control	5.2 ± 0.3	3.6 ± 0.3	4.7 ± 0.3	4.3 ± 0.3	12.6 miles @ 226^o
15*	Pole 66, W. Boundary – Bible Camp	3.7 ± 0.2	3.7 ± 0.1	3.9 ± 0.2	3.6 ± 0.1	0.9 miles @ 237^o
18*	Energy Info. Center – Lamp Post, SW	4.6 ± 0.2	4.3 ± 0.1	4.8 ± 0.2	4.2 ± 0.3	0.4 miles @ 265^o
19	East Boundary-JAF, Pole 9	4.2 ± 0.3	4.2 ± 0.3	4.5 ± 0.2	4.0 ± 0.5	1.3 miles @ 81^o
23*	H On-site	5.6 ± 0.6	5.4 ± 0.5	5.2 ± 0.3	4.1 ± 0.2	0.8 miles @ 70^o
24	I On-site	5.4 ± 0.4	4.3 ± 0.3	4.5 ± 0.2	3.9 ± 0.3	0.8 miles @ 98^o
25	J On-site	4.8 ± 0.3	3.9 ± 0.2	4.4 ± 0.1	3.8 ± 0.2	0.9 miles @ 110^o
26	K On-site	5.1 ± 0.3	4.0 ± 0.2	4.5 ± 0.2	3.7 ± 0.2	0.5 miles @ 132^o
27	N. Fence, N. of Switchyard, JAF	19.8 ± 1.0	18.9 ± 0.8	17.6 ± 1.5	12.4 ± 0.8	0.4 miles @ 60^o
28	N. Light Pole, N. of Screenhouse, JAF	24.6 ± 1.2	24.8 ± 2.1	23.2 ± 2.2	19.1 ± 0.9	0.5 miles @ 68^o
29	N. Fence, N. of W. Side	22.2 ± 1.0	21.2 ± 0.8	20.7 ± 1.0	14.9 ± 1.1	0.5 miles @ 65^o
30	N. Fence, (NW) JAF	14.5 ± 0.3	12.2 ± 1.1	13.9 ± 0.8	9.6 ± 1.0	0.4 miles @ 57^o
31	N. Fence, (NW) NMP-1	7.7 ± 0.3	7.0 ± 0.5	6.5 ± 0.4	6.1 ± 0.3	0.2 miles @ 276^o
39	N. Fence, Rad. Waste-NMP-1	10.0 ± 0.6	9.1 ± 0.3	10.0 ± 0.5	8.4 ± 0.7	0.2 miles @ 292^o
47	N. Fence, (NE) JAF	6.9 ± 0.3	6.9 ± 0.3	6.6 ± 0.4	5.2 ± 0.3	0.6 miles @ 69^o
49*	Phoenix, NY-Control	4.6 ± 0.4	3.9 ± 0.3	3.4 ± 0.2	3.4 ± 0.3	19.8 miles @ 170^o
51	Liberty & Bronson Sts., E of OSS	4.9 ± 0.5	4.2 ± 0.2	3.7 ± 0.1	3.8 ± 0.2	7.4 miles @ 233^o

(1) Direction and distance based on NMP-2 reactor centerline and sixteen 22.5^o sector grid.
(2) TLD lost in the field.
* TLD required by TS/ODCM

TABLE 6-10 (continued)

DIRECT RADIATION MEASUREMENT RESULTS - 2002

Results in Units of mrem/std. Month ± 1 Sigma

LOCATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)(1)
52	E.12th & Cayuga Sts., Oswego 58 School	5.0 ± 0.3	4.1 ± 0.2	3.7 ± 0.1	3.8 ± 0.2	5.8 miles @ 227°
53	Broadwell & Chestnut Sts. Fulton H.S.	4.9 ± 0.4	4.3 ± 0.3	4.5 ± 0.1	3.9 ± 0.2	13.7 miles @ 183°
54	Liberty St. & Co. Rt. 16 Mexico H.S.	4.7 ± 0.2	4.1 ± 0.2	4.2 ± 0.2	3.8 ± 0.2	9.3 miles @ 115°
55	Gas Substation Co. Rt. 5-Pulaski	4.5 ± 0.2	4.1 ± 0.1	4.0 ± 0.1	3.7 ± 0.5	13.0 miles @ 75°
56*	Rt. 104-New Haven Sch. (SE Corner)	4.6 ± 0.3	4.6 ± 0.3	4.4 ± 0.2	3.8 ± 0.3	5.3 miles @ 123°
58*	Co. Rt. 1A-Alcan (E. of E. Entrance Rd.	4.7 ± 0.2	4.1 ± 0.2	4.2 ± 0.2	3.5 ± 0.1	3.1 miles @ 220°
75*	Unit 2, N. Fence, N. of Reactor Bldg.	7.5 ± 0.3	7.1 ± 0.2	6.8 ± 0.5	6.0 ± 0.1	0.1 miles @ 5°
76*	Unit 2, N. Fence, N. of Change House	6.1 ± 0.4	6.1 ± 0.4	5.3 ± 0.4	4.9 ± 0.4	0.1 miles @ 25°
77*	Unit 2, N. Fence, N. of Pipe Bldg.	6.8 ± 0.3	6.7 ± 0.4	6.0 ± 0.3	5.1 ± 0.3	0.2 miles @ 45°
78*	JAF. E. of E. Old Lay Down Area	5.1 ± 0.3	4.7 ± 0.2	4.2 ± 0.2	4.5 ± 0.4	1.0 miles @ 90°
79*	Co. Rt.29, Pole #63, 0.2 mi. s. of Lake Rd.	4.6 ± 0.1	4.2 ± 0.3	4.4 ± 0.2	3.6 ± 0.2	1.1 miles @ 115°
80*	Co Rt. 29, Pole #54, 0.7 mi. S. of Lake Rd.	4.7 ± 0.3	4.4 ± 0.2	4.2 ± 0.2	3.6 ± 0.2	1.4 miles @ 133°
81*	Miner Rd., Pole #16, 0.5 mi. W. of Rt.29	4.8 ± 0.4	4.2 ± 0.4	4.2 ± 0.3	3.6 ± 0.4	1.6 miles @ 159°
82*	Miner Rd., Pole #1-1/2, 1.1 mi. W. of Rt.29	4.6 ± 0.2	4.2 ± 0.4	4.5 ± 0.4	3.8 ± 0.3	1.6 miles @ 181°
83*	Lakeview Rd., Tree 0.45 mi. N. of Miner Rd.	4.6 ± 0.4	4.3 ± 0.3	4.5 ± 0.5	3.7 ± 0.4	1.2 miles @ 200°
84*	Lakeview Rd., N., Pole #6117, 200ft. N. of Lake Rd.	4.7 ± 0.2	4.5 ± 0.2	4.5 ± 0.4	4.6 ± 0.3	1.1miles @ 225°
85*	Unit 1, N. Fence, N. of W. Side of Screen House	9.1 ± 0.4	8.7 ± 0.3	9.4 ± 0.5	7.0 ± 0.3	0.2 miles @ 294°
86*	Unit 2, N. Fence, of W. Side of Screen House	7.8 ± 0.3	7.2 ± 0.4	7.8 ± 0.4	7.1 ± 0.3	0.1 miles @ 315°
87*	Unit 2, N. Fence. N. of E. Side of Screen House	7.8 ± 0.2	7.3 ± 0.5	7.9 ± 0.6	6.6 ± 0.4	0.1 miles @ 341°
88*	Hickory Grove Rd., Pole#2, 0.6 mi. N. of Rt.1	4.5 ± 0.2	4.0 ± 0.2	4.4 ± 0.5	4.1 ± 0.3	4.8 miles @ 97°
89*	Leavitt Rd., Pole #16, 0.4 mi. S. of Rt.1	5.1 ± 0.3	4.4 ± 0.2	5.0 ± 0.2	4.7 ± 0.4	4.1 miles @ 111°
90*	Rt. 104, Pole #300, 150 ft. E. of Keefe Rd.	4.4 ± 0.3	4.0 ± 0.1	4.1 ± 0.3	3.3 ± 0.2	4.2 miles @ 135°
91*	Rt. 51A, Pole #59, 0.8 mi. W. of Rt.51	Lost (2)	4.7 ± 0.7	4.0 ± 0.2	3.1 ± 0.1	4.8 miles @ 156°
92*	Maiden Lane Rd., Power Pole, 0.6 mi. S. of Rt. 104	4.9 ± 0.4	5.3 ± 0.4	4.4 ± 0.2	3.8 ± 0.5	4.4 miles @ 183°
93*	Rt. 53 Pole 1-1, 120 ft. S. of Rt. 104	4.2 ± 0.2	4.2 ± 0.2	3.9 ± 0.1	3.7 ± 0.3	4.4 miles @ 205°

(1) Direction and distance based on NMP-2 reactor centerline and sixteen 22.5° sector grid.
(2) TLD lost in the field.
* TLD required by TS/ODCM

TABLE 6-10 (continued)

DIRECT RADIATION MEASUREMENT RESULTS - 2002

Results in Units of mrem/std. Month ± 1 Sigma

LOCATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)(1)
94*	Rt. 1, Pole #82, 250 ft. E. of Kocher Rd. (Co. Rt. #63)	4.6 ± 0.3	4.0 ± 0.1	3.9 ± 0.2	3.8 ± 0.2	4.7 miles @ 223°
95*	Lakeshore Campsite, from alcanW. Access Rd., Ple#21, 1.2 mi. N. of Rt.1	4.3 ± 0.3	3.8 ± 0.3	3.6 ± 0.3	3.5 ± 0.1	4.1 miles @ 237°
96*	Creamery Rd., 0.3 mi. S. of Middle Rd., Pole 1-1/2	4.5 ± 0.1	4.1 ± 0.1	4.1 ± 0.2	4.0 ± 0.3	3.6 miles @ 199°
97*	Rt. 29, Pole #50, 200 ft. N. of Miner Rd.	4.7 ± 0.2	4.2 ± 0.1	3.9 ± 0.2	4.0 ± 0.2	1.8 miles @ 143°
98*	Lake Rd., Pole #145, 0.15 mi. E. of Rt. 29	4.7 ± 0.2	4.1 ± 0.2	4.3 ± 0.2	3.7 ± 0.6	1.2 miles @ 101°
99	NMP Rd., 0.4 mi. N. of Lake Rd., Env. Station R1 Off-site	4.9 ± 0.4	4.5 ± 0.1	4.5 ± 0.1	4.2 ± 0.2	1.8 miles @ 88°
100	Rt. 29 & Lake Rd., Env. Station R2 Off-site	5.1 ± 0.2	4.4 ± 0.2	4.4 ± 0.3	3.5 ± 0.2	1.1 miles @ 104°
101	Rt. 29, 0.7 mi. S. of Lake Rd., Env. Station R3 Off-site	4.6 ± 0.2	4.2 ± 0.3	3.8 ± 0.2	3.9 ± 0.2	1.5 miles @ 132°
102	EOF/Env. Lab, Oswego Co. Airport (Fulton Airport, Rt. 176) E. Driveway, Lamp Post	4.8 ± 0.5	4.2 ± 0.2	4.0 ± 0.2	3.2 ± 0.1	11.9 miles @ 175°
103	EIC, East Garage Rd., Lamp Post, R3 Off-site	5.3 ± 0.3	4.9 ± 0.2	4.5 ± 0.3	3.7 ± 0.2	0.4 miles @ 267°
104	Parkhurst Road, Pole #148-1/2A, 0.1 mi. S. of Lake Rd.	4.6 ± 0.2	4.2 ± 0.1	4.0 ± 0.3	3.7 ± 0.3	1.4 miles @ 102°
105	Lakeview Rd. Pole #6125, 0.6 mi. S. of Lake Rd.	4.9 ± 0.1	4.1 ± 0.4	4.1 ± 0.2	3.3 ± 0.2	1.4 miles @ 198°
106	Shoreline Cove, W. of NMP-1, Tree on W. Edge	5.5 ± 0.2	5.1 ± 0.2	4.7 ± 0.4	5.2 ± 0.2	0.3 miles @ 274°
107	Shoreline Cove, W. of NMP-1	5.5 ± 0.2	5.1 ± 0.3	4.7 ± 0.3	5.0 ± 0.4	0.3 miles @ 272°
108	Lake Rd., Pole #142, 300 ft. E. of Rt. 29 S.	4.9 ± 0.2	4.2 ± 0.1	4.0 ± 0.2	4.1 ± 0.2	1.1 miles @ 104°
109	Tree North of Lake Rd., 300 ft. E. of Rt. 29 N.	4.8 ± 0.2	4.3 ± 0.1	3.9 ± 0.3	3.5 ± 0.1	1.1 miles @ 103°
111	Sterling, NY	4.8 ± 0.6	4.2 ± 0.5	3.9 ± 0.2	3.8 ± 0.3	26.4 miles @ 166°
112	EOF/Env. Lab, Oswego Co. Airport	4.7 ± 0.1	4.1 ± 0.3	3.9 ± 0.2	3.8 ± 0.2	11.9 miles @ 175°
113	Control, Baldwinsville, NY	5.0 ± 0.3	3.8 ± 0.2	3.7 ± 0.2	3.4 ± 0.2	21.8 miles @ 214°

(1) Direction and distance based on NMP-2 reactor centerline and sixteen 22.5° sector grid.
(2) TLD lost in the field.
* TLD required by TS/ODCM

TABLE 6-11
CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK - 2002
Results in Units of pCi/liter ± 1 Sigma

SAMPLE LOCATION No. 4***

COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La-140	OTHERSH
04/08/02	<0.396	1720 ± 50	<2.60	<4.07	<4.06	<LLD
04/22/02	<0.429	1630 ± 66	<5.13	<5.43	<5.80	<LLD
05/06/02	<0.352	1410 ± 81	<7.52	<7.62	<8.73	<LLD
05/20/02	<0.401	1670 ± 87	<5.82	<6.40	<7.42	<LLD
06/03/02	<0.582	1540 ± 66	<4.52	<5.72	<6.22	<LLD
06/17/02	<0.410	1580 ± 66	<4.02	<5.33	<5.41	<LLD
07/08/02	<0.491	1550 ± 66	<5.14	<5.18	<4.45	<LLD
07/22/02	<0.357	1540 ± 63	<4.81	<4.47	<6.17	<LLD
08/05/02	<0.517	1520 ± 76	<5.28	<5.85	<5.69	<LLD
08/19/02	<0.434	1650 ± 58	<3.24	<5.18	<4.96	<LLD
09/09/02	<0.381	2260 ± 59	<2.40	<4.27	<4.01	<LLD
09/23/02	<0.450	1570 ± 68	<5.30	<5.39	<6.13	<LLD
10/07/02	<0.461	1530 ± 84	<6.11	<7.45	<8.00	<LLD
10/21/02	<0.406	1600 ± 86	<6.23	<6.45	<6.90	<LLD
11/04/02	<0.411	1620 ± 49	<4.36	<3.96	<4.57	<LLD
11/18/02	<0.418	1480 ± 64	<5.43	<5.42	<5.80	<LLD
12/02/02	<0.377	1610 ± 85	<6.52	<6.57	<7.57	<LLD
12/16/02	<0.530	1360 ± 76	<5.98	<6.06	<7.64	<LLD

SAMPLE LOCATION No. 50***

COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La-140	OTHERSH
04/08/02	<0.363	1590 ± 69	<3.59	<5.16	<7.33	<LLD
04/22/02	<0.371	1470 ± 65	<5.30	<5.25	<5.13	<LLD
05/06/02	<0.423	1450 ± 62	<4.70	<4.88	<4.55	<LLD
05/20/02	<0.450	1490 ± 65	<4.81	<5.18	<7.03	<LLD
06/03/02	<0.580	1400 ± 62	<5.19	<4.81	<5.94	<LLD
06/17/02	<0.456	1590 ± 64	<4.59	<4.61	<5.62	<LLD
07/08/02	<0.483	1590 ± 49	<4.42	<3.85	<4.76	<LLD
07/22/02	<0.421	1740 ± 72	<5.63	<5.34	<7.04	<LLD
08/05/02	<0.421	1500 ± 76	<6.27	<7.19	<6.20	<LLD
08/19/02	<0.518	1490 ± 74	<5.69	<6.01	<7.50	<LLD
09/09/02	<0.453	1420 ± 63	<4.53	<5.09	<5.61	<LLD
09/23/02	<0.448	1570 ± 70	<6.64	<6.18	<7.43	<LLD
10/07/02	<0.394	1530 ± 67	<4.74	<5.05	<6.14	<LLD
10/21/02	<0.494	1610 ± 71	<5.92	<5.69	<6.80	<LLD
11/04/02	<0.511	1660 ± 72	<3.82	<5.74	<6.56	<LLD
11/18/02	<0.382	1370 ± 77	<6.81	<6.57	<6.31	<LLD
12/02/02	<0.511	1610 ± 67	<3.14	<4.77	<6.38	<LLD
12/16/02	<0.438	1530 ± 65	<4.74	<5.42	<6.68	<LLD

*** Corresponds to sample location noted on Figure 3.3-4.
† Plant related radionuclides.

TABLE 6-11 (continued)
CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK - 2002
Results in Units of pCi/liter ± 1 Sigma

SAMPLE LOCATION No. 55***						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La-140	OTHERSH
04/08/02	<0.475	1510 ± 65	<4.62	<4.68	<4.58	<LLD
04/22/02	<0.449	1480 ± 65	<5.31	<4.93	<5.89	<LLD
05/06/02	<0.349	1580 ± 49	<2.45	<4.15	<4.80	<LLD
05/20/02	<0.346	1480 ± 65	<5.08	<5.48	<5.40	<LLD
06/03/02	<0.349	1490 ± 65	<4.30	<4.68	<5.40	<LLD
06/17/02	<0.389	1690 ± 88	<7.13	<7.16	<6.36	<LLD
07/08/02	<0.373	1630 ± 70	<3.91	<5.28	<6.56	<LLD
07/22/02	<0.367	1590 ± 67	<5.92	<5.34	<4.82	<LLD
08/05/02	<0.413	1670 ± 79	<5.31	<5.57	<5.43	<LLD
08/19/02	<0.542	1480 ± 75	<6.38	<6.72	<5.63	<LLD
09/09/02	<0.491	1760 ± 52	<2.81	<4.12	<5.06	<LLD
09/23/02	<0.474	1700 ± 51	<2.84	<4.18	<4.55	<LLD
10/07/02	<0.515	1560 ± 66	<4.72	<4.50	<3.88	<LLD
10/21/02	<0.413	1640 ± 50	<2.85	<3.72	<2.36	<LLD
11/04/02	<0.428	1380 ± 62	<5.25	<5.41	<7.05	<LLD
11/18/02	<0.448	1740 ± 71	<5.90	<5.57	<3.97	<LLD
12/02/02	<0.392	1710 ± 71	<5.68	<5.40	<6.52	<LLD
12/16/02	<0.448	1540 ± 64	<4.87	<4.32	<4.90	<LLD

SAMPLE LOCATION No. 60***						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La-140	OTHERSH
04/07/02	<0.495	1430 ± 64	<3.77	<5.64	<6.58	<LLD
04/21/02	<0.465	1720 ± 51	<2.32	<4.04	<3.73	<LLD
05/05/02	<0.436	1550 ± 67	<5.03	<5.18	<5.52	<LLD
05/19/02	<0.385	1610 ± 70	<3.85	<5.34	<8.01	<LLD
06/02/02	<0.512	1480 ± 84	<6.42	<6.66	<9.62	<LLD
06/16/02	<0.726	1760 ± 72	<5.91	<5.57	<6.17	<LLD
07/08/02	<0.456	1600 ± 68	<5.24	<5.42	<5.29	<LLD
07/21/02	<0.357	1580 ± 66	<5.03	<5.33	<4.69	<LLD
08/04/02	<0.409	1410 ± 91	<8.16	<8.03	<10.9	<LLD
08/18/02	<0.477	1350 ± 91	<6.76	<8.22	<11.5	<LLD
09/09/02	<0.484	1780 ± 74	<5.47	<5.25	<7.57	<LLD
09/23/02	<0.437	1640 ± 71	<3.44	<5.38	<7.13	<LLD
10/07/02	<0.441	1690 ± 72	<3.56	<5.18	<7.67	<LLD
10/21/02	<0.426	1600 ± 50	<2.62	<4.35	<4.11	<LLD
11/04/02	<0.424	1560 ± 82	<6.52	<5.64	<8.03	<LLD
11/18/02	<0.477	1660 ± 70	<5.49	<5.57	<7.56	<LLD
12/02/02	<0.433	1510 ± 64	<4.93	<5.32	<5.42	<LLD
12/16/02	<0.354	1520 ± 66	<4.56	<4.68	<4.05	<LLD

*** Corresponds to sample location noted on Figure 3.3-4.
H Plant related radionuclides.

TABLE 6-11 (continued)
CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK - 2002
Results in Units of pCi/liter ± 1 Sigma

SAMPLE LOCATION No. 76***						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La-140	OTHERS[H]
04/08/02	<0.546	1410 ± 81	<6.29	<6.79	<9.18	<LLD
04/22/02	<0.365	1620 ± 70	<5.94	<5.22	<6.80	<LLD
05/06/02	<0.444	1580 ± 67	<5.03	<5.02	<4.43	<LLD
05/20/02	<0.412	1410 ± 61	<4.41	<5.32	<5.78	<LLD
06/03/02	<0.518	1560 ± 70	<6.69	<6.26	<9.00	<LLD
06/17/02	<0.483	1610 ± 49	<2.67	<4.12	<3.65	<LLD
07/08/02	<0.382	1730 ± 52	<2.64	<4.07	<4.94	<LLD
07/22/02	<0.428	1670 ± 86	<5.51	<6.69	<7.98	<LLD
08/05/02	<0.467	1750 ± 85	<7.50	<7.08	<10.7	<LLD
08/19/02	<0.551	1680 ± 82	<7.36	<5.72	<1.34	<LLD
09/09/02	<0.470	1700 ± 72	<4.91	<5.63	<8.24	<LLD
09/23/02	<0.548	1590 ± 67	<5.18	<4.18	<4.74	<LLD
10/07/02	<0.563	1560 ± 86	<6.79	<6.97	<6.32	<LLD
10/21/02	<0.496	1630 ± 68	<4.90	<5.90	<6.95	<LLD
11/04/02	<0.530	1490 ± 65	<3.89	<5.49	<6.13	<LLD
11/18/02	<0.391	1650 ± 50	<2.76	<4.01	<4.44	<LLD
12/02/02	<0.516	1590 ± 49	<2.32	<3.76	<4.34	<LLD
12/16/02	<0.382	1460 ± 64	<4.62	<4.31	<5.38	<LLD

SAMPLE LOCATION No. 77*** (Control)*						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La-140	OTHERS[H]
04/08/02	<0.432	1530 ± 65	<5.43	<5.26	<5.12	<LLD
04/22/02	<0.392	1600 ± 67	<5.74	<5.93	<6.67	<LLD
05/06/02	<0.356	1700 ± 72	<5.82	<5.10	<6.83	<LLD
05/20/02	<0.344	1560 ± 66	<5.30	<5.34	<4.42	<LLD
06/03/02	<0.507	1440 ± 69	<5.47	<6.51	<5.89	<LLD
06/17/02	<0.466	1560 ± 66	<5.10	<5.18	<5.13	<LLD
07/08/02	<0.373	1680 ± 66	<4.47	<5.26	<4.24	<LLD
07/22/02	<0.549	1750 ± 52	<2.61	<3.70	<3.49	<LLD
08/05/02	<0.484	1720 ± 59	<3.24	<4.21	<4.81	<LLD
08/19/02	<0.416	1660 ± 82	<5.88	<6.62	<6.19	<LLD
09/09/02	<0.391	1800 ± 53	<2.53	<3.82	<3.79	<LLD
09/23/02	<0.509	1620 ± 50	<4.14	<4.10	<3.43	<LLD
10/07/02	<0.504	1500 ± 66	<5.09	<5.72	<6.35	<LLD
10/21/02	<0.465	1310 ± 63	<5.59	<6.53	<6.38	<LLD
11/04/02	<0.504	1510 ± 63	<5.19	<4.61	<5.89	<LLD
11/17/02	<0.480	1740 ± 50	<2.79	<3.90	<4.27	<LLD
12/02/02	<0.478	1510 ± 64	<5.29	<4.95	<5.62	<LLD
12/16/02	<0.391	1650 ± 50	<3.81	<4.03	<3.77	<LLD

*** Corresponds to sample location noted on Figure 3.3-4.
* Sample location required by TS/ODCM.
H Plant related radionuclides.

TABLE 6-12

CONCENTRATIONS OF GAMMA EMITTERS IN FOOD PRODUCTS - 2002

Results in Units of pCi/g (wet) ± 1 Sigma

COLLECTION SITE	SAMPLE DATE	DESCRIPTION	Be-7	K-40	I-131	Cs-134	Cs-137	Zn-65
Culeton*	09/24/2002	Grape Leaves	1.13 ± 0.069	4.80 ± 0.168	< 0.018	< 0.012	< 0.016	< 0.048
		Pepper Leaves	0.261 ± 0.039	9.79 ± 0.166	< 0.015	< 0.009	< 0.013	< 0.020
		Tomatoes	< 0.057	2.15 ± 0.087	< 0.010	< 0.008	< 0.007	< 0.020
Barton*	09/17/02	Squash Leaves	1.01 ± 0.036	2.93 ± 0.084	< 0.007	< 0.007	< 0.007	< 0.019
		Pepper Leaves	0.234 ± 0.022	5.16 ± 0.101	< 0.007	< 0.005	< 0.006	< 0.016
		Tomatoes	< 0.035	2.20 ± 0.055	< 0.005	< 0.004	< 0.004	< 0.011
Whaley**	09/17/02	Squash Leaves	1.29 ± 0.057	4.96 ± 0.147	< 0.014	< 0.009	< 0.012	< 0.034
		Tomatoes	< 0.030	2.99 ± 0.049	< 0.004	< 0.002	< 0.004	< 0.006
		Cabbage	0.303 ± 0.045	4.99 ± 0.164	< 0.015	< 0.015	< 0.014	< 0.033
		Pepper Leaves	0.789 ± 0.044	7.56 ± 0.159	< 0.011	< 0.010	< 0.012	< 0.028
Fredette**	09/18/02	Squash Leaves	1.45 ± 0.056	4.44 ± 0.133	< 0.012	< 0.008	< 0.011	< 0.030
Flack* (Control)	09/24/02	Squash Leaves	0.354 ± 0.043	4.13 ± 0.140	< 0.014	< 0.014	< 0.013	< 0.034
		Tomatoes	< 0.050	2.68 ± 0.081	< 0.008	< 0.008	< 0.006	< 0.017
		Cabbage	0.153 ± 0.035	4.56 ± 0.141	< 0.014	< 0.015	< 0.012	< 0.029
		Pepper Leaves	0.249 ± 0.052	10.6 ± 0.219	< 0.018	< 0.011	< 0.015	< 0.047
		Grape Leaves	0.782 ± 0.051	3.89 ± 0.118	< 0.017	< 0.010	< 0.014	< 0.019

* Sample location required by TS/ODCM.
** Optional sample location.
Note: Other plant related radionuclides <LLD.

TABLE 6-13

MILK ANIMAL CENSUS 2002

TOWN OR AREA [(a)]	NUMBER ON CENSUS MAP [(1)]	DEGREES [(2)]	DISTANCE [(2)] (miles)	NUMBER OF MILK ANIMALS
Scriba	3	190°	4.5	NONE
	62	183°	6.7	4G[(3)]
New Haven	75	146°	7.5	1C
	9	95°	5.2	45C
	4*	113°	7.8	100C
	64	107°	7.9	48C
Mexico	14	120°	9.8	56C
	19	132°	10.5	5C
	60*	90°	9.5	27C
	76*	132°	5.2	56C
	50*	93°	9.1	110C
	55*	95°	9.0	52C
	21	112°	10.5	70C
	72	98°	9.9	37C
Sterling	73*	234°	13.9	NONE
Richland	22	85°	13.9	2C
Volney	25	182°	9.5	NONE
	63	185°	8.0	NONE
Granby (Control)	77**	191°	13.9	70C

MILKING ANIMAL TOTALS: (including control locations) 679 Cows, 4 Goats

MILKING ANIMAL TOTALS: (excluding control locations) 609 Cows, 4 Goats

NOTES:

C = Cows
G = Goats
* = Milk sample location
** = Milk sample control location
(1) = Reference Figure 3.3-4
(2) = Degrees and distance are based on NMP-2 reactor building centerline
(3) = Goat is not currently producing milk or any milk produced is utilized by the owner
NONE = No cows or goats at that location. Location was a previous location with cows and/or goats
(a) = Census performed out to a distance of approximately 10 miles

TABLE 6-14

2002 RESIDENCE CENSUS

LOCATION	MAP LOCATION [b]	METEOROLOGICAL SECTOR	DEGREES [a]	DISTANCE [a]
*		N	-	-
*		NNE	-	-
*		NE	-	-
*		ENE	-	-
Sunset Bay	A	E	82^o	0.9 miles
Lake Road	B	ESE	119^o	0.7 miles
Parkhurst Road	C	SE	127^o	1.2 miles
County Route 29	D	SSE	149^o	1.2 miles
Miner Road	E	S	173^o	1.6 miles
Lakeview Road	F	SSW	210^o	1.7 miles
Lakeview Road	G	SW	233^o	1.5 miles
Bible Camp Retreat	H	WSW	249^o	1.3 miles
*		W	-	-
*		WNW	-	-
*		NW	-	-
*		NNW	-	-

NOTES:

* This meteorological sector is over Lake Ontario. There is no residence within five miles
(a) Based on J.A. FitzPatrick Nuclear Power Plant Reactor Centerline.
(b) Corresponds to Figure 3.3-4.

7.0 HISTORICAL DATA TABLES

Sample Statistics from Previous Environmental Sampling

The mean, minimum value and maximum value were calculated for selected sample mediums and isotopes.

Special Considerations:

1. Sample data listed as 1969 was taken from the NINE MILE POINT, PREOPERATION SURVEY, 1969 and ENVIRONMENTAL MONITORING REPORT FOR NIAGARA MOHAWK POWER CORPORATION NINE MILE POINT NUCLEAR STATION, NOVEMBER, 1970.

2. Sample data listed as 1974 and 1978 through 1997 was taken from the respective environmental operating reports for Nine Mile Point Nuclear Station and James A. FitzPatrick Nuclear Power Plant.

3. Only measured values were used for statistical calculations.

4. The term MDL was used prior to 1979 to represent the concept of Lower Limit of Detection (LLD). MDL = Minimum Detectable Level.

TABLE 7-1

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SHORELINE SEDIMENT

Results in pCi/g (dry)

LOCATION: CONTROL *

Isotope	Cs-134			Cs-137			Co-60		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969[H]	**	**	**	**	**	**	**	**	**
1974[H]	**	**	**	**	**	**	**	**	**
1975[H]	**	**	**	**	**	**	**	**	**
1983	**	**	**	**	**	**	**	**	**
1984	**	**	**	**	**	**	**	**	**
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	0.027	0.027	0.027	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* **Langs Beach - beyond influence of the site in a westerly direction.**

** **No data. Sample not required until new technical specifications implemented in 1985.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-2

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SHORELINE SEDIMENT

Results in pCi/g (dry)

LOCATION: INDICATOR *									
Isotope	**Cs-134**			**Cs-137**			**Co-60**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969H	**	**	**	**	**	**	**	**	**
1974H	**	**	**	**	**	**	**	**	**
1975H	**	**	**	**	**	**	**	**	**
1983	**	**	**	**	**	**	**	**	**
1984	**	**	**	**	**	**	**	**	**
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	0.25	0.32	0.29	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	0.28	0.30	0.29	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	0.12	0.14	0.13	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	0.12	0.14	0.13	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	0.18	0.46	0.32	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	0.06	0.37	0.22	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	0.14	0.15	0.15	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	0.15	0.17	0.16	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	0.11	0.17	0.14	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	0.06	0.06	0.06	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	0.06	0.10	0.08	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	0.06	0.07	0.06	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	0.06	0.07	0.07	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	0.05	0.05	0.05	<LLD	<LLD	<LLD

* **Sunset Beach - closest off-site location with recreational value.**

** **No data. Sample not required until new technical specifications implemented in 1985.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-3

HISTORICAL ENVIRONMENTAL SAMPLE DATA

FISH

Results in pCi/g (wet)

LOCATION: CONTROL *			
Isotope	Cs-137		
Year	Min.	Max.	Mean
1969H	No Data	No Data	No Data
1974H	0.94	0.94	0.94
1975H	<MDL	<MDL	<MDL
1976	1.2	1.2	1.2
1983	0.040	0.060	0.050
1984	0.015	0.038	0.032
1985	0.026	0.047	0.034
1986	0.021	0.032	0.025
1987	0.017	0.040	0.031
1988	0.023	0.053	0.034
1989	0.028	0.043	0.034
1990	0.033	0.079	0.045
1991	0.021	0.034	0.029
1992	0.019	0.026	0.022
1993	0.030	0.036	0.033
1994	0.014	0.031	0.022
1995	0.017	0.023	0.019
1996	0.018	0.022	0.020
1997	0.012	0.030	0.021
1998	0.013	0.013	0.013
1999	<LLD	<LLD	<LLD
2000	0.021	0.021	0.021
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD

* **Control location was at an area beyond the influence of the site (westerly direction).**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-4

HISTORICAL ENVIRONMENTAL SAMPLE DATA

FISH

Results in pCi/g (wet)

LOCATION: INDICATOR * (NMP/JAF)			
Isotope	**Cs-137**		
Year	**Min.**	**Max.**	**Mean**
1969H	0.01	0.13	0.06
1974H	0.08	4.40	0.57
1975H	1.10	1.70	1.38
1976	0.50	3.90	1.4
1983	0.030	0.060	0.050
1984	0.033	0.061	0.043
1985	0.018	0.045	0.030
1986	0.009	0.051	0.028
1987	0.024	0.063	0.033
1988	0.022	0.054	0.032
1989	0.020	0.044	0.034
1990	0.027	0.093	0.040
1991	0.018	0.045	0.029
1992	0.014	0.030	0.024
1993	0.018	0.035	0.028
1994	0.015	0.023	0.019
1995	0.016	0.022	0.019
1996	0.016	0.025	0.020
1997	0.014	0.023	0.018
1998	0.021	0.021	0.021
1999	0.018	0.021	0.020
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD
2002	0.016	0.016	0.016

* **Indicator locations are in the general area of the NMP-1 and J.A. FitzPatrick cooling water discharge structures.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-5

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SURFACE WATER

Results in pCi/liter

LOCATION: CONTROL †						
Isotope	**Cs-137**			**Co-60**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969[HH]	*	*	*	*	*	*
1974[HH]	*	*	*	*	*	*
1975[HH]	*	*	*	*	*	*
1983	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* **No gamma analysis performed (not required).**

H **Location was the City of Oswego Water Supply for 1969 - 1984 and the Oswego Steam Station inlet canal for 1985 - 2001.**

HH **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-6

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SURFACE WATER

Results in pCi/liter

LOCATION: INDICATOR †						
Isotope	**Cs-137**			**Co-60**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969[HH]	*	*	*	*	*	*
1974[HH]	*	*	*	*	*	*
1975[HH]	*	*	*	*	*	*
1983	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* **No gamma analysis performed (not required).**

H **Indicator location was the NMP 1 Inlet Canal for the period 1969 - 1973, and the JAF Inlet Canal for 1974 - 2001.**

HH **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-7

HISTORICAL ENVIRONMENTAL SAMPLE DATA
SURFACE WATER TRITIUM

Results in pCi/liter

LOCATION: CONTROL *			
Isotope	**Tritium**		
Year	**Min.**	**Max.**	**Mean**
1969H	No Data	No Data	No Data
1974H	<MDL	<MDL	<MDL
1975H	311	414	362
1983	230	280	250
1984	190	220	205
1985	230	430	288
1986	250	550	373
1987	140	270	210
1988	240	460	320
1989	143	217	186
1990	260	320	290
1991	180	200	190
1992	190	310	243
1993	160	230	188
1994	250	250	250
1995	230	230	230
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	190	190	190
1999	220	510	365
2000	196	237	212
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD

* **Control location is the City of Oswego, drinking water for 1969 - 1984 and the Oswego Steam Station inlet canal for 1985 - 2001.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-8

HISTORICAL ENVIRONMENTAL SAMPLE DATA
SURFACE WATER TRITIUM

Results in pCi/liter

LOCATION: INDICATOR *			
Isotope	**Tritium**		
Year	**Min.**	**Max.**	**Mean**
1969H	No Data	No Data	No Data
1974H	380	500	440
1975H	124	482	335
1983	190	560	317
1984	110	370	282
1985	250	1200**	530
1986	260	500	380
1987	160	410	322
1988	430	480	460
1989	135	288	225
1990	220	290	250
1991	250	390	310
1992	240	300	273
1993	200	280	242
1994	180	260	220
1995	320	320	320
1996	<LLD	<LLD	<LLD
1997	160	160	160
1998	190	190	190
1999	180	270	233
2000	161	198	185
2001	<LLD	<LLD	<LLD
2002	297	297	297

* **Indicator location was the NMP-1 Inlet Canal during the period 1969-1973, and the JAF Inlet Canal for 1974-2001.**

** **Suspect sample contamination. Recollected samples showed normal levels of tritium.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-9

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR PARTICULATE GROSS BETA

Results in pCi/m^3

LOCATION: CONTROL *			
Isotope	**Gross Beta**		
Year	**Min.**	**Max.**	**Mean**
1969H	0.130	0.540	0.334
1974H	0.001	0.808	0.121
1975H	0.008	0.294	0.085
1983	0.007	0.085	0.024
1984	0.013	0.051	0.026
1985	0.013	0.043	0.024
1986	0.008	0.272	0.039
1987	0.009	0.037	0.021
1988	0.008	0.039	0.018
1989	0.007	0.039	0.017
1990	0.003	0.027	0.013
1991	0.007	0.028	0.014
1992	0.006	0.020	0.012
1993	0.007	0.022	0.013
1994	0.008	0.025	0.015
1995	0.006	0.023	0.014
1996	0.008	0.023	0.014
1997	0.006	0.025	0.013
1998	0.004	0.034	0.014
1999	0.010	0.032	0.017
2000	0.006	0.027	0.015
2001	0.006	0.034	0.016
2002	0.008	0.027	0.016

* **Locations used for 1977 - 1984 were C off-site, D1 off-site, D2 off-site, E off-site, F off-site, and G off-site. Control location R-5 off-site was used for 1985-2001 (formerly C off-site location).**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-10

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR PARTICULATE GROSS BETA

Results in pCi/m^3

LOCATION: INDICATOR *			
Isotope	**Gross Beta**		
Year	**Min.**	**Max.**	**Mean**
1969H	0.130	0.520	0.320
1974H	0.003	0.885	0.058
1975H	0.001	0.456	0.067
1983	0.003	0.062	0.023
1984	0.001	0.058	0.025
1985	0.001	0.044	0.021
1986	0.007	0.289	0.039
1987	0.009	0.040	0.021
1988	0.007	0.040	0.018
1989	0.007	0.041	0.017
1990	0.006	0.023	0.014
1991	0.006	0.033	0.015
1992	0.005	0.024	0.013
1993	0.005	0.023	0.014
1994	0.006	0.024	0.015
1995	0.004	0.031	0.014
1996	0.006	0.025	0.013
1997	0.001	0.018	0.010
1998	0.002	0.040	0.015
1999	0.009	0.039	0.017
2000	0.005	0.033	0.015
2001	0.004	0.037	0.016
2002	0.006	0.026	0.016

* **Locations used for 1969 - 1973 were D1 on-site, D2 on-site, E on-site, F on-site and G on-site. Locations used for 1974 - 1984 were D1 on-site, D2 on-site, E on-site, F on-site, G on-site, H on-site, I on-site, J on-site and K on-site, as applicable. 1985 - 2001 locations were R-1 off-site, R-2 off-site, R-3 off-site, and R-4 off-site.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-11

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR PARTICULATES

Results in pCi/m^3

LOCATION: CONTROL **						
Isotope	**Cs-137**			**Co-60**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969H	*	*	*	*	*	*
1974H	*	*	*	*	*	*
1975H	*	*	*	*	*	*
1983	0.0002	0.0002	0.0002	0.0007	0.0007	0.0007
1984	<LLD	<LLD	<LLD	0.0004	0.0012	0.0008
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	0.0075	0.0311	0.0193	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* **No data available (not required prior to 1977).**

** **Locations included composites of off-site air monitoring locations for 1977 - 1984. Sample location included only R-5 air monitoring location for 1985 - 2001.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-12

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR PARTICULATES

Results in pCi/m^3

LOCATION: INDICATOR **						
Isotope	**Cs-137**			**Co-60**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969H	*	*	*	*	*	*
1974H	*	*	*	*	*	*
1975H	*	*	*	*	*	*
1983	0.0002	0.0003	0.0002	0.0003	0.0017	0.0007
1984	<LLD	<LLD	<LLD	0.0007	0.0017	0.0012
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	0.0069	0.0364	0.0183	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	0.0048	0.0048	0.0048
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* **No data available (not required prior to 1977).**

** **Locations included composites of on-site air monitoring locations for 1977 - 1984. Sample locations included R-1 through R-4 air monitoring locations for 1985 - 2001.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-13

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR RADIOIODINE

Results in pCi/m^3

LOCATION: CONTROL *			
Isotope	**Iodine-131**		
Year	**Min.**	**Max.**	**Mean**
1969H	**	**	**
1974H	**	**	**
1975H	<MDL	<MDL	<MDL
1983	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD
1986	0.041	0.332	0.151
1987	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD

* **Locations D1 off-site, D2 off-site, E off-site, F off-site and G off-site used for 1976 - 1984. Location R-5 off-site used for 1985 – 2001.**

** **No results - I-131 analysis not required.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-14

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR RADIOIODINE

Results in pCi/m^3

LOCATION: INDICATOR *			
Isotope	Iodine-131		
Year	Min.	Max.	Mean
1969H	**	**	**
1974H	**	**	**
1975H	0.25	0.30	0.28
1983	0.022	0.035	0.028
1984	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD
1986	0.023	0.360	0.119
1987	0.011	0.018	0.014
1988	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD

***** **Locations used for 1976 - 1984 were D1 on-site, D2 on-site, E on-site, F on-site, G on-site, H on-site, I on-site, J on-site and K on-site, as applicable. Locations used for 1985 - 2002 were R-1 off-site, R-2 off-site, R-3 off-site, and R-4 off-site.**

****** **No results - I-131 analysis not required.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-15A

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem/standard month

LOCATION: CONTROL **			
Year	**Min.**	**Max.**	**Mean**
PreopH	*	*	*
1974H	2.7	8.9	5.6
1975H	4.8	6.0	5.5
1983	4.9	7.2	5.8
1984	4.7	8.2	6.2
1985	4.5	7.6	5.6
1986	5.3	7.5	6.3
1987	4.6	6.6	5.4
1988	4.4	6.8	5.6
1989	2.9	6.4	4.7
1990	3.7	6.0	4.7
1991	3.8	5.8	4.7
1992	2.6	5.1	4.1
1993	3.4	5.7	4.4
1994	3.1	5.0	4.1
1995	3.4	5.7	4.4
1996	3.4	5.6	4.3
1997	3.7	6.2	4.7
1998	3.7	5.6	4.4
1999	3.6	7.1	4.6
2000	3.7	7.3	4.7
2001	3.6	5.4	4.4
2002	3.4	5.5	4.3

* **Data not available.**

** **TLD #8 and 14 established 1974, TLD #49 established 1980, TLD #111 established 1988, TLD #113 established 1991.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-15B

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: RETS CONTROL **			
Year	**Min.**	**Max.**	**Mean**
PreopH	*	*	*
1974H	2.7	8.9	5.6
1975H	4.8	6.0	5.5
1983	4.9	7.2	5.8
1984	4.7	8.2	6.2
1985	4.4	6.8	5.4
1986	5.5	7.2	6.3
1987	4.6	5.8	5.2
1988	4.8	6.8	5.4
1989	2.9	6.4	4.1
1990	3.7	6.0	4.8
1991	3.8	5.3	4.6
1992	2.6	4.7	3.9
1993	3.4	5.3	4.4
1994	3.1	4.6	3.9
1995	3.4	4.9	4.2
1996	3.4	5.6	4.2
1997	3.9	5.2	4.6
1998	3.7	4.8	4.2
1999	3.7	4.7	4.4
2000	3.7	5.5	4.3
2001	3.9	5.0	4.4
2002	3.4	5.2	4.1

* **Data not available.**

** **TLD #14 established 1974, TLD #49 established 1980.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-16A

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: SITE BOUNDRY **			
Year	**Min.**	**Max.**	**Mean**
PreopH	*	*	*
1974H	*	*	*
1975H	*	*	*
1983	*	*	*
1984	*	*	*
1985	4.9 (4.1)	5.9(12.6)	5.3(6.2)
1986	5.4(4.4)	6.8(18.7)	5.9(7.0)
1987	4.7(4.4)	5.9(14.3)	5.3(6.1)
1988	5.0(3.4)	6.1(17.9)	5.4(6.4)
1989	4.5(2.8)	5.2(15.4)	4.8(5.9)
1990	4.5(3.6)	5.4(14.9)	4.8(6.4)
1991	4.3(3.2)	5.5(16.7)	4.8(6.0)
1992	3.7(3.2)	4.6(10.4)	4.2(5.1)
1993	3.8(3.3)	4.8(11.7)	4.3(5.4)
1994	2.8(2.8)	4.9(12.4)	4.0(5.2)
1995	3.5(3.5)	5.1(9.6)	4.4(5.4)
1996	3.2(3.2)	5.3(9.1)	4.1(5.2)
1997	3.5(3.5)	5.9(10.2)	4.6(5.9)
1998	3.7(3.7)	5.1(9.4)	4.4(5.4)
1999	3.3(3.3)	7.5(12.3)	4.7(5.8)
2000	3.6(3.6)	6.8(10.0)	4.5(5.6)
2001	3.6(3.6)	5.3(10.3)	4.5(5.7)
2002	3.5(3.5)	5.1(9.4)	4.3(5.4)

* **Data not available (not required prior to 1985).**

** **TLD #7, 18 and 23 established 1972 – 1974.**
TLD # 75-87 established 1985.
TLD #23, 75, 76, 77, 85, 86 and 87 are in close proximity to operational buildings along the north boundary. This boundary is the lakeshore and is considered to be generally not accessible to the public. The doses from these locations are not included in the historical data statistics, but are shown in the summary table as ( ) data.

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-16B

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: OFF-SITE SECTORS **			
Year	**Min.**	**Max.**	**Mean**
PreopH	*	*	*
1974H	*	*	*
1975H	*	*	*
1983	*	*	*
1984	*	*	*
1985	4.0	7.1	5.0
1986	4.6	8.6	6.0
1987	4.3	6.0	5.2
1988	3.8	7.0	5.3
1989	2.5	6.8	4.9
1990	3.6	6.3	4.7
1991	3.6	5.8	4.7
1992	2.9	5.0	4.1
1993	3.4	6.3	4.5
1994	3.0	5.1	4.0
1995	3.2	5.2	4.3
1996	3.2	5.3	4.2
1997	3.5	5.8	4.4
1998	3.5	5.0	4.2
1999	3.6	5.6	4.4
2000	3.4	6.6	4.5
2001	3.6	5.4	4.4
2002	3.1	5.3	4.2

* **Data not available (not required prior to 1985).**

** **TLD locations initiated in 1985 as required by the New Technical Specifications. Includes TLD numbers 88, 89, 90, 91, 92, 93, 94 and 95.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-16C

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: SPECIAL INTEREST **			
Year	**Min.**	**Max.**	**Mean**
PreopH	*	*	*
1974H	*	*	*
1975H	*	*	*
1983	*	*	*
1984	*	*	*
1985	3.9	6.8	5.3
1986	4.8	8.2	6.1
1987	3.5	6.0	5.1
1988	3.9	6.6	5.3
1989	2.1	6.4	4.9
1990	3.2	6.3	4.8
1991	2.9	5.6	4.4
1992	3.0	4.8	4.1
1993	3.2	5.8	4.5
1994	2.9	4.8	4.1
1995	3.6	4.8	4.2
1996	3.2	5.1	4.2
1997	3.5	6.2	4.6
1998	3.7	5.6	4.4
1999	3.6	7.1	4.6
2000	3.6	7.3	4.7
2001	3.8	5.4	4.4
2002	3.5	5.5	4.2

* **Data not available (not required prior to 1985).**

** **TLD locations initiated in 1985 as required by the New Technical Specifications. Includes TLD numbers 8, 15, 56, 58, 96, 97 and 98, which are located near critical residences and populated areas near the site.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-16D

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

Preop +	*	*	*
1974 +	3.1	10.6	5.7
1975 +	4.6	16.0	7.3
1983	5.0	16.5	6.9
1984	4.6	13.2	7.0
1985	4.7	15.9	6.3
1986	4.7	16.1	7.0
1987	4.0	11.4	5.8
1988	4.4	11.9	6.0
1989	2.7	13.1	6.0
1990	3.6	12.9	5.5
1991	3.2	11.6	5.4
1992	3.2	5.6	4.3
1993	3.1	13.6	5.2
1994	2.8	14.3	5.1
1995	3.5	28.6	6.2
1996	3.1	32.6	6.4
1997	3.5	28.8	8.1
1998	3.6	28.8	6.2
1999	3.3	28.4	6.6
2000	3.7	16.5	5.6
2001	3.8	14.5	5.6
2002	3.5	13.6	5.3

*** No data available.**

**** Includes TLD numbers 3, 4, 5, 6 and 7 (1970 - 1973). Includes TLD numbers 3, 4, 5, 6, 7, 23, 24, 25 and 26 (1974 - 2001). Locations are existing or previous on-site environmental air monitoring locations.**

+ 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-16E

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: OFF-SITE INDICATOR **			
Year	**Min.**	**Max.**	**Mean**
PreopH	*	*	*
1974H	2.4	8.9	5.3
1975H	4.5	7.1	5.5
1983	4.6	7.2	5.6
1984	4.6	8.2	6.1
1985	4.6	7.7	5.5
1986	5.0	7.6	6.1
1987	4.4	6.6	5.2
1988	4.2	6.6	5.4
1989	2.8	6.4	4.6
1990	3.8	6.1	4.8
1991	3.4	5.8	4.5
1992	3.1	5.2	4.1
1993	3.2	5.7	5.0
1994	3.0	5.1	4.1
1995	3.9	5.7	4.4
1996	3.3	5.5	4.1
1997	3.7	6.2	4.7
1998	3.9	5.6	4.5
1999	3.8	7.1	4.6
2000	3.8	7.3	4.6
2001	3.7	5.9	4.6
2002	3.6	5.5	4.4

* **No data available.**

** **Includes TLD numbers 8, 9, 10, 11, 12 and 13 (off-site environmental air monitoring locations).**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-17

HISTORICAL ENVIRONMENTAL SAMPLE DATA

MILK

Results in pCi/liter

LOCATION: CONTROL **						
Isotope	Cs-137			I-131		
Year	Min.	Max.	Mean	Min.	Max.	Mean
1969H	*	*	*	*	*	*
1974H	*	*	*	*	*	*
1975H	*	*	*	*	*	*
1983	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	5.3	12.4	8.4	0.8	29.0	13.6
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* **No data available (sample not required).**

** **Location used was an available milk sample location in a least prevalent wind direction greater than ten miles from the site.**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-18

HISTORICAL ENVIRONMENTAL SAMPLE DATA

MILK

Results in pCi/liter

LOCATION: INDICATOR						
Isotope	**Cs-137**			**I-131**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969H	*	*	*	*	*	*
1974H	1.6	39	10.5	0.70	2.00	1.23
1975H	6.0	22	16	0.01	2.99	0.37
1983	5.1	5.1	5.1	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	6.1	11.1	8.6	0.3	30.0	5.2
1987	5.5	9.4	7.4	<LLD	<LLD	<LLD
1988	10.0	10.0	10.0	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	0.25	.044	0.35
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* **No data available (sample not required).**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

TABLE 7-19

HISTORICAL ENVIRONMENTAL SAMPLE DATA

FOOD PRODUCTS [HH]

Results in pCi/g (wet)

LOCATION: CONTROL *			
Isotope	**Cs-137**		
Year	**Min.**	**Max.**	**Mean**
1969[H]	**	**	**
1974[H]	**	**	**
1975[H]	**	**	**
1983	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD
1993	0.008	0.008	0.008
1994	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD

* **Locations was an available food product sample location in a least prevalent wind direction greater than ten miles from the site.**

** **No data available (control samples not required).**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

HH **Data comprised of broadleaf and non-broadleaf vegetation (1980-1984). Data comprised of broadleaf vegetation only (1985-2001).**

TABLE 7-20

HISTORICAL ENVIRONMENTAL SAMPLE DATA

FOOD PRODUCTS HH

Results in pCi/g (wet)

LOCATION: INDICATOR *			
Isotope	**Cs-137**		
Year	**Min.**	**Max.**	**Mean**
1969H	**	**	**
1974H	0.04	0.34	0.142
1975H	<MDL	<MDL	<MDL
1983	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD
1985	0.047	0.047	0.047
1986	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD
1988	0.008	0.008	0.008
1989	0.011	0.011	0.011
1990	<LLD	<LLD	<LLD
1991	0.039	0.039	0.039
1992	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD
1994	0.006	0.012	0.010
1995	0.011	0.012	0.012
1996	<LLD	<LLD	<LLD
1997	0.013	0.013	0.013
1998	<LLD	<LLD	<LLD
1999	0.007	0.007	0.007
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD

* **Indicator locations were available downwind locations within ten miles of the site and with high deposition potential.**

** **No data available (control samples not required).**

H **1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.**

HH **Data comprised of broadleaf and non-broadleaf vegetation (1976-1984). Data comprised of broadleaf vegetation only (1985-2001).**

8.0 QA/QC PROGRAM

8.1 PROGRAM DESCRIPTION

The previous Technical Specifications and the current Offsite Dose Calculation Manual (ODCM), Part 1, Section 5.3 requires that the licensee participate in an Interlaboratory Comparison Program. The Interlaboratory Comparison Program shall include sample media for which samples are routinely collected and for which Comparison samples are commercially available. Participation in an Interlaboratory Comparison Program ensures that independent checks on the precision and accuracy of the measurement of radioactive material in the environmental samples are performed as part of the Quality Assurance Program for environmental monitoring. To fulfill the requirement for an Interlaboratory Comparison Program, the JAF Environmental Laboratory has engaged the services of two independent laboratories to provide quality assurance comparison samples. The two laboratories are Analytics, Incorporated in Atlanta, Georgia and the U.S. Department of Energy's Environmental Measurements Laboratory (EML) in New York City.

Analytics supplies requested sample media as blind sample spikes, which contain certified levels of radioactivity unknown to the analysis laboratory. These samples are prepared and analyzed using standard laboratory procedures. The results are submitted to Analytics, which issues a statistical summary report. The JAFNPP Environmental Laboratory uses predetermined acceptance criteria methodology for evaluating the laboratory’s performance for Analytic's sample results.

In addition to the Analytics Program, the JAF Environmental Laboratory participated in the Environmental Measurements Laboratory (EML) Quality Assessment Program (QAP). EML supplies sample media as blind sample spikes to approximately 127 laboratories worldwide. These samples, containing a spiked amount of low level activity, are analyzed using standard laboratory procedures. The results are submitted to the Environmental Measurements Laboratory for statistical evaluation. Reports are provided to each participating laboratory, which provide an evaluation of the laboratory’s performance.

During 2002, tritium analyses for the JAF Environmental Laboratory were performed by Framatome, ANP.

8.2 PROGRAM SCHEDULE

SAMPLE MEDIA	LABORATORY ANALYSIS	SAMPLE PROVIDER ANALYTICS	EML	YEARLY TOTAL
Water	Gross Beta	0	2	2
Water	Tritium	1	2	3
Water	I-131	2	0	2
Water	Mixed Gamma	2	2	4
Air	Gross Beta	2	2	4
Air	I-131	2	0	2
Air	Mixed Gamma	2	2	4
Milk	I-131	2	0	2
Milk	Mixed Gamma	2	0	2
Soil	Mixed Gamma	1	0	1
Vegetation	Mixed Gamma	1	0	1
TOTAL SAMPLE INVENTORY		17	10	27

8.3 ACCEPTANCE CRITERIA

Each sample result is evaluated to determine the accuracy and precision of the laboratory's analysis result. The evaluation method for the QA sample results is dependent on the supplier of the sample. The sample evaluation methods are discussed below.

8.3.1 ANALYTICS SAMPLE RESULTS

Samples provided by Analytics are evaluated using what is specified as the NRC method. This method is based on the calculation of the ratio of results reported by the participating laboratory (QC result) to the Vendor Laboratory Known value (reference result).

An Environmental Laboratory analytical result is evaluated using the following calculation:

The value for the error resolution is calculated.

$$\text{The error resolution} = \frac{\text{Reference Result}}{\text{Reference Results Error}}$$

Using the appropriate row under the Error Resolution column in Table 8.3.1 below, a corresponding Ratio of Agreement interval is given.

The value for the ratio is then calculated.

$$\text{Ratio of Agreement} = \frac{\text{QC Result}}{\text{Reference Result}}$$

If the value falls within the agreement interval, the result is acceptable.

TABLE 8.3.1

ERROR RESOLUTION	RATIO OF AGREEMENT
≤ 3	0.4-2.5
3.1 to 7.5	0.5-2.0
7.6 to 15.5	0.6-1.66
15.6 to 50.5	0.75-1.33
50.6 to 200	0.8-1.25
>200	0.85-1.18

Again, this acceptance test is generally referred to as the "NRC" method. The acceptance criteria is contained in Procedure DVP-04.01 and was taken from the Criteria of Comparing Analytical Results (USNRC) and Bevington, P.R., Data Reduction and Error Analysis for the Physical Sciences, McGraw-Hill, New York, (1969). The NRC method generally results in an acceptance range of approximately ± 25% of the Known value when applied to sample results from the Analytics Inc. Interlaboratory Comparison Program. This method is used as the procedurally required assessment method and requires the generation of a nonconformity report when results are unacceptable.

8.3.2 ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)

The laboratory's analytical performance is evaluated by EML based on the historical analytical capabilities for individual analyte/matrix pairs. The statistical criteria for Acceptable Performance, "A", has been chosen by EML to be between the 15th and 85th percentile of the cumulative normalized distribution, which can be viewed as the middle 70% of all historic measurements. The Acceptable With Warning criteria, "W", is between the 5th and 15th percentile and between the 85th and 95th percentile. In other words, the middle 70% of all reported values are acceptable, while the other 5th-15th (10%) and 85th-95th percentiles (10%) are in the warning area. The Not Acceptable criteria, "N", is established at less than the 5th percentile and greater than the 95th percentile, that is, the outer 10% of the historical data. Using five years of historical analytical data, the EML, determined performance results using the percentile criteria summarized below:

Result	Cumulative Normalized Distribution
Acceptable ("A")	15% - 85%
Acceptable with Warning ("W")	5% - 15% or 85% - 95%
Not Acceptable ("N")	<5% or >95%

8.4 PROGRAM RESULTS SUMMARY

The Interlaboratory Comparison Program numerical results are provided on Table 8-1.

8.4.1 ANALYTICS QA SAMPLES RESULTS

Seventeen QA blind spike samples were analyzed as part of Analytics 2002 Interlaboratory Comparison Program. The following sample media were evaluated as part of the comparison program.

- Air Charcoal Cartridge, I-131
- Air Particulate Filter, Mixed Gamma Emitters/Gross Beta
- Water, I-131/Mixed Gamma Emitters/Tritium
- Soil, Mixed Gamma Emitters
- Milk, I-131 Mixed Gamma Emitters
- Vegetation, Mixed Gamma Emitters

The JAF Environmental Laboratory performed 79 individual analyses on the seventeen QA samples. Of the 79 analyses performed, 77 were in agreement using the NRC acceptance criteria for a 97.5% agreement ratio.

Sample non-conformities are discussed in Section 8.4.1.1.

8.4.1.1 ANALYTICS SAMPLE NONCONFORMITIES

A. Analytics Sample E-3286-05, Cr-51 in Milk
Nonconformity No. 02-09

A spiked mixed gamma in milk sample supplied by Analytics, Inc., was analyzed in accordance with standard laboratory procedures. The sample contained a total of nine radionuclides for analysis. Nine of the nine radionuclides present were quantified. Eight of the nine radionuclides were quantified within the acceptable range. The results for Cr-51 were determined to be outside the QA Acceptance Criteria. The milk sample was analyzed on three different detectors with the mean Cr-51 results reported as 176.7 pCi/l. The known results for the sample was 227 pCi/l as determined by the supplier.

An evaluation of the Cr-51 result was performed. The spectrum and peak search results were examined with no abnormalities identified. Cr-51 decays by electron capture with a 27.7 day half-life and a gamma ray energy of 320 KeV with a yield of 9.8%. No secondary gamma energies are produced in the Cr-51 decay scheme. This low gamma energy yield and short half-life will result in very low net counts for samples containing environmental levels of Cr-51. The average net count rate of the three analyses ranged from a high of 1.9 counts per minute to a low of 0.68 counts per minute. One of the three reported results was 244 pCi/l and resulted in an agreement when compared to the known of 227 with a ratio of 1.07. This result had an associated counting error of 13.1%. The remaining two counts had ratios of 0.55 and 0.71 with high associated counting errors of 29.3% and 21.2% respectively.

The combination of the following; low sample activity, very small net count rate, short half-life, low gamma energy, and small gamma yield, resulted in an inaccurate sample result. The wide range of the associated counting errors demonstrates the low confidence level in the reported results. The poor analytical results for this sample is not routine and does not indicate a programmatic deficiency in the analysis of Cr-51 in milk samples or other environmental media. Confidence in the accurate analysis of Cr-51 can be demonstrated by other Cr-51 analytical results, both in the sample results for the 2002 QA program and historical Cr-51 QA results. The Cr-51 results for the other Quality Assurance samples analyzed as part of the 2002 Interlaboratory Comparison Program were all acceptable and are summarized below:

2002 Cr-51 Results

Sample ID	Reference Medium	JAF	Reference	Ratio
E-3051-05	WATER pCi/liter	234±20	198±10	1.18
E-3284-05	WATER pCi/liter	324±23	304±15	1.07
E-3052-05	FILTER pCi/filter	187±13	203±10	0.92
E-3285-05	FILTER pCi/filter	157±13	141±7	1.11
E-3215-05	MILK pCi/liter	239±19	235±12	1.02
E-3218-05	VEGETATION pCi/kg	408±23	403±20	1.01
E-3216-05	SOIL pCi/kg	370±75	318±16	1.16
		Mean Ratio	=	1.07

A review of historical QA data for 2001 was also performed to determine if this is a recurring systematic error or bias. In 2001, eleven QA samples were analyzed which contained Cr-51. The mean ratio for these samples relative to the known (reference) value is 98.5. There were two Cr-51 nonconformities in the 2001 Interlaboratory Comparison Program and were determined not to be systematic or programmatic errors. The historic Cr-51 nonconformities were a low percentage of the overall gamma spectroscopy QA program and have been determined to be the result of the low sample activity and low gamma yields for Cr-51 in the spiked samples. Analytical methods and system calibrations are not the cause of this nonconformity, based on the accurate results achieved for the analysis of the other eight radionuclides present in the sample. No corrective actions were implemented as a result of this nonconformity.

B. Filter Analytics Sample E-3285-05
Nonconformity No. 02-08, Air Particulate Gamma Emitters

The gamma spectral analysis of sample E-3285-05 resulted in the quantification of nine radionuclides. Results for eight of the identified radionuclides were in agreement with the reference value and one measurement was in disagreement. The Fe-59 results had a calculated ratio of 1.29, which places the results outside the acceptable limit. The sample ratio of 1.29 demonstrates that the Fe-59 sample result is biased high. An evaluation of the Fe-59 result was performed. Fe-59 concentrations were detected in three of the three analysis reported for this sample. The spectrum and peak search results were examined with no abnormalities identified. Fe-59 decays with a 44.5 day half-life with two gamma ray energies of 1099 KeV and 1291 KeV with yields of 57% and 43% respectively. Fe-59 concentrations were identified at both the 1099 KeV and 1291 KeV peaks in all three analysis with the following results.

Concentration
pCi/filter

Detector Number	**Peak 1 1099 KeV**	**Peak 2 1291 KeV**	**Mean Concentration**
1	69.9	79.3	73.5
2	68.5	61.4	65.4
8	74.7	73.0	73.9
Mean pCi/filter	71.0	71.2	70.9
Ratio	1.29	1.30	1.29

There were no significant differences for the activity that was measured at either of the two Fe-59 peaks. The number of total counts measured in both of these peaks maybe biased high due to coincidence counting as the result of other radionuclides that are present in the sample. The relatively low gamma yield and low activity of 55 pCi/Kg may have also contributed to the inaccuracy of this sample result.

Fe-59 was measured in seven other samples analyzed as part of the 2002 Interlaboratory Comparison Program. All of these samples were in agreement with the reference laboratory with a mean agreement ratio of 1.09. This mean ratio of greater than 1.09 would indicated that these samples were biased high and the bias was the possible result of coincidence counting from other radionuclides in the sample. The amount of bias experienced in most Interlaboratory Comparison Program samples due to coincidence counting has been limited to less than 20 percent and has resulted in sample results which were statistically acceptable when compared to the reference value. Changes to the radionuclide library were made in 2001 to direct the gamma spectroscopy software to calculate the mean concentration value based on both the 1099 KeV and 1291 KeV peaks. In most gamma spectrums, this has reduced the effect of the coincidence count on the Fe-59 analytical results as the 1291 KeV peak may be less affected by the coincidence counting in multiple radionuclide samples. No corrective actions were implemented as a result of this nonconformity.

8.4.2 ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)

In 2002, JAF Environmental Laboratory participated in both the EML Quality Assessment Programs, QAP-56 and QAP-57. Sample sets consisted of the following sample media:

- Water - Gross Beta/Mixed Gamma Emitters
- Water - Tritium
- Air Particulate Filter - Mixed Gamma Emitters/Gross Beta

A total of 10 samples containing 18 individual radionuclides were evaluated for the samples included in QAP-56 and QAP-57. Using the EML acceptance criteria, 17 of 18 radionuclides analyses (94.4%) were evaluated to be acceptable. Results for the EML cross Check Program can be viewed on-line at www.eml.doe.gov. A summary of the JAF Environmental Laboratory results is as follows:

Matrix	Total Analyses	Acceptable	Not Acceptable
Air	10	10	0
Water	8	7	1
Total	18	17	1
Percentage		94.4%	5.6%

8.4.2.1 EML SAMPLE NONCONFORMITIES

A. EML Sample QAP-56, Cs-134 in Water
Nonconformity No. 02-02

The QAP-56 gamma in water sample contained three radionuclides for evaluation; Cs-137, Cs-134 and Co-60. Two of the three radionuclides present, Co-60 and Cs-137, were quantified with agreement ratios of 1.02 and 0.99, respectively. The JAF laboratory reported a Cs-134 result of 2.6 ± 0.5 Bq/L (70.3 pCi/l). The EML known activity was reported as 3.357 Bq/L (90.74 pCi/L). The agreement ratio for the Cs-134 analysis was 0.77, which placed the result outside the acceptable range. The cause of the nonconformity is attributed to several factors. The concentration of Cs-134 in the sample was very small at 3.36 Bq/L and resulted in a one sigma counting error of approximately 20%. By comparison, the one sigma counting errors for the Co-60 result was 1.0% and the one sigma counting error for the Cs-137 result was 1.3%. The high associated counting error was the result of the low count rate measured for the Cs-134 peak and resulted in poor counting statistics. The measurement of the Cs-134 concentration in this sample was further complicated by the presence of an interference peak at 609 KeV. The combination of the low concentration and interference from 609 KeV peak were both contributing factors in the non-conforming result. A review of the EML summary statistics for this sample showed a relatively high failure or nonconformity rate for other laboratories participating in this sample comparison. Their statistics are as follows:

EML Summary QAP-56
Cs-134 in Water

Isotope	No. Labs Reporting	% in Agreement	% with Warning	% not in Agreement
Cs-134	116	60.3	23.3	16.40
Cs-137	146	87.0	11.0	2.10

As the table shows for the 116 laboratories reporting results, only 60.3% were in agreement with the known value. 16.4% of the participating laboratories were not in agreement and 23.3% of laboratories reporting results were in the warning range for the reported results. An additional 30 laboratories reported no results for the Cs-134 concentration. By comparison, the statistics for the Cs-137 concentration showed a failure rate of only 2.1% and acceptable results for 87% of the results reported for the study.

The Cs-134 results reported for the 2002 QAP-57 study, conducted in the second half of the year, were acceptable with an agreement ratio of 1.0. Cs-134 was measured in nine other comparison samples analyzed as part of the 2002 Interlaboratory Comparison Program. The mean ratio for all the reported results was 0.96 and there were no nonconformities. These results demonstrate that there is no programmatic or systematic error inherent to the analyses of Cs-134 in environmental sample medium. No corrective action was implemented as a result of this nonconformity.

TABLE 8-1
INTERLABORATORY INTERCOMPARISON PROGRAM
Gross Beta Analysis of Air Particulate Filters(pCi/filter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (2)	RATIO (3)
6/13/02	E-3214-05	AIR pCi/filter	GROSS BETA	27.5±1.3 24.8±1.3 25.9±1.3 Mean = 26.1±0.8	25±1	1.04, A
12/5/02	E-3467-05	AIR pCi/filter	GROSS BETA	114.7±1.2 114.3±1.2 113.1±1.2 Mean = 114.0±0.7	127±6	0.90, A

(1) Results reported as activity ± 1 sigma.
(2) Results reported as activity ± 3 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Tritium Analysis of Water (pCi/liter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (2)	RATIO (3)
03/14/02	E-3050-05	WATER pCi/liter	H-3	10080±140 9880±140 10130±140 Mean = 10030±81	10026±501	1.0, A

(1) Results reported as activity ± 1 sigma. Sample Analyzed by Framatome, ANP
(2) Results reported as activity ± 3 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Samples provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Iodine Analysis of Water, Air and Milk

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (2)	RATIO (3)
03/14/02	E-3051-05	WATER pCi/liter	I-131**	58.5±1.6 57.6±1.8 60.9±1.2 Mean = 59.0±0.9	61±3	0.97, A
06/13/02	E-3217-05	AIR pCi/cc	I-131	80.2±7.4 104.0±8.1 112.0±8.5 Mean = 98.7±4.6	93±5	1.06, A
06/13/02	E-3215-05	MILK pCi/liter	I-131**	75.8±1.0 80.4±1.2 76.8±1.3 Mean = 77.7±0.7	87±4	0.90, A
09/12/02	E-3287-05	AIR pCi/cc	I-131	84.4±7.1 78.8±8.8 83.2±7.0 Mean = 82.4±4.4	81±4	1.01, A
09/12/02	E-3284-05	WATER pCi/liter	I-131**	76.8±1.2 72.6±1.2 75.3±1.1 Mean = 74.9±0.7	79±4	0.95, A
09/12/02	E-3286-05	MILK pCi/liter	I-131**	69.8±1.5 73.8±1.3 72.1±1.5 Mean = 71.9±0.8	80±4	0.90, A

(1) Results reported as activity ± 1 sigma.
(2) Results reported as activity ± 3 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Samples provided by Analytics, Inc.
(**) Result determined by Resin Extraction/Gamma Spectral Analysis.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Water (pCi/liter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (2)	RATIO (3)
03/14/02	E-3051-05	WATER pCi/liter	Ce-141	248.0±9.5 251.0±8.3 249.0±8.3 Mean = 249.0±5.0	242±12	1.03, A
			Cr-51	222.0±35.5 249.0±35.6 232.0±33.4 Mean = 234.3±20.1	198±10	1.18, A
			Cs-134	80.8±5.1 82.6±4.3 79.1±4.3 Mean = 80.8±2.6	91±5	0.89, A
			Cs-137	184.0±6.6 183.0±6.4 191.0±6.4 Mean = 186.0±3.7	197±10	0.94, A
			Mn-54	183.0±6.8 172.0±6.4 185.0±6.4 Mean = 180.0±3.8	166±8	1.08, A
			Fe-59	91.4±7.0 110.0±6.7 89.8±6.1 Mean = 97.1±3.8	86±4	1.13, A
			Zn-65	160.0±11.1 182.0±9.9 167.0±10.6 Mean = 169.7±6.1	164±8	1.04, A
			Co-60	109.0±4.3 124.0±4.3 110.0±4.0 Mean = 114.3±2.4	117±6	0.97, A

(1) Results reported as activity ± 1 sigma.
(2) Results reported as activity ± 3 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Water (pCi/liter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (2)	RATIO (3)
09/19/02	E-3284-05	WATER pCi/liter	Ce-141	230.0±9.3 221.0±7.6 224.0±9.7 Mean = 225.0±5.1	214±11	1.05, A
			Cr-51	321.0±38.1 264.0±34.9 389.0±46.1 Mean = 324.7±23.1	304±15	1.07, A
			Cs-134	172.0±6.9 171.0±6.4 167.0±7.9 Mean = 170.0±4.1	176±9	0.97, A
			Cs-137	150.0±6.4 171.0±6.2 174.0±7.9 Mean = 165.0±4.0	169±8	0.98, A
			Mn-54	208.0±7.1 217.0±7.2 232.0±9.1 Mean = 219.0±4.5	204±10	1.07, A
			Fe-59	120.0±7.0 133.0±7.1 127.0±8.8 Mean = 126.7±4.5	119±6	1.07, A
			Zn-65	271.0±13.1 272.0±12.8 242.0±15.9 Mean = 261.7±8.1	251±13	1.04, A
			Co-60	191.0±5.3 185.0±5.3 191.0±6.6 Mean = 189.0±3.3	199±10	0.95, A
			Co-58	130.0±6.2 139.0±6.1 130.0±8.0 Mean = 133.0±3.9	130±7	1.02, A

(1) Results reported as activity ± 1 sigma.
(2) Results reported as activity ± 3 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Air Particulate Filters (pCi/filter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (2)	RATIO (3)
03/14/02	E-3052-05	FILTER pCi/filter	Ce-141	236.0±5.8 226.0±5.6 236.0±6.5 Mean = 232.0±3.5	248±12	0.94, A
			Cr-51	186.0±22.2 217.0±22.3 158.0±24.2 Mean = 187.0±13.2	203±10	0.92, A
			Cs-134	75.7±4.7 93.5±4.9 80.5±5.7 Mean = 83.2±2.9	93±5	0.89, A
			Cs-137	205.0±6.4 204.0±6.4 193.0±7.3 Mean = 200.7±3.9	202±10	1.00, A
			Mn-54	175.0±6.3 178.0±6.5 178.0±7.6 Mean = 177.0±4.0	170±9	1.04, A
			Fe-59	93.9±6.5 98.9±6.9 101.0±7.9 Mean = 97.9±4.1	88±4	1.11, A
			Zn-65	178.0±11.1 169.0±11.2 167.0±12.9 Mean = 171.3±6.8	168±8	1.02, A
			Co-60	113.0±4.3 120.0±4.6 121.0±5.3 Mean = 118.0±2.7	120±6	0.98, A

(1) Results reported as activity ± 1 sigma.
(2) Results reported as activity ± 3 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Air Particulate Filters (pCi/filter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (2)	RATIO (3)
09/20/02	E-3285-05	FILTER pCi/filter	Ce-141	109.0±4.2 104.0±4.3 109.0±4.1 Mean = 107.3±2.4	99±5	1.08, A
			Cr-51	159.0±21.4 175.0±22.5 137.0±21.3 Mean = 157.0±12.6	141±7	1.11, A
			Cs-134	82.8±5.0 82.6±5.2 87.5±4.9 Mean = 84.3±2.9	82±4	1.02, A
			Cs-137	92.2±4.7 91.2±5.0 91.2±4.6 Mean = 91.5±2.8	79±4	1.16, A
			Mn-54	114.0±5.6 116.0±5.8 112.0±5.4 Mean = 114.0±3.2	95±5	1.20, A
			Fe-59	73.5±6.0 65.4±6.5 73.9±5.9 Mean = 70.9±3.5	55±3	1.29, D NC-02-08
			Zn-65	140.0±10.2 143.0±10.8 153.0±10.4 Mean = 145.3±6.0	117±6	1.24, A
			Co-60	91.2±4.1 98.0±4.3 99.4±4.2 Mean = 96.2±2.4	92±5	1.04, A
			Co-58	76.0±4.7 72.0±4.9 65.7±4.4 Mean = 71.2±2.7	60±3	1.18, A

(1) Results reported as activity ± 1 sigma.
(2) Results reported as activity ± 3 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.
(D) Evaluation Results Disagreement.
(NC) Nonconformity Report Number.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Milk (pCi/liter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (2)	RATIO (3)
06/13/02	E-3215-05	MILK pCi/liter	Ce-141	92.2±7.2 93.5±5.9 82.7±6.7 Mean = 89.5±3.8	90±5	1.00, A
			Cr-51	230.0±33.5 206.0±30.6 282.0±32.8 Mean = 239.3±18.7	235±12	1.02, A
			Cs-134	111.0±5.4 112.0±5.3 115.0±5.1 Mean = 112.7±3.0	120±6	0.94, A
			Cs-137	93.9±5.1 88.0±4.8 87.5±5.1 Mean = 89.8±2.9	91±5	0.99, A
			Mn-54	98.8±5.3 93.1±5.1 103.0±5.3 Mean = 98.3±3.0	95±5	1.03, A
			Fe-59	83.3±6.4 88.8±6.4 84.4±6.7 Mean = 85.5±3.8	81±4	1.06, A
			Zn-65	187.0±11.7 157.0±10.4 192.0±11.7 Mean = 178.7±6.5	180±9	0.99, A
			Co-60	115.0±4.4 124.0±4.4 124.0±4.4 Mean = 121.0±2.5	125±6	0.97, A
			Co-58	92.4±5.6 99.4±5.3 93.8±5.1 Mean = 95.2±3.1	100±5	0.95, A

(1) Results reported as activity ± 1 sigma.
(2) Results reported as activity ± 3 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Milk (pCi/liter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (2)	RATIO (3)
09/12/02	E-3286-05	MILK pCi/liter	Ce-141	159.0±6.7 153.0±8.6 162.0±7.0 Mean = 158.0±4.3	160±8	0.99, A
			Cr-51	244.0±32.0 125.0±36.6 161.0±34.1 Mean = 176.7±19.8	227±11	0.78, D NC-02-09
			Cs-134	120.0±5.7 118.0±7.0 115.0±5.6 Mean = 117.7±3.5	132±7	0.89, A
			Cs-137	111.0±5.5 129.0±6.9 124.0±5.6 Mean = 121.3±3.5	127±6	0.95, A
			Mn-54	159.0±6.2 146.0±7.6 151.0±6.0 Mean = 152.0±3.8	152±8	1.00, A
			Fe-59	93.7±6.5 102.0±8.4 91.8±6.4 Mean = 95.8±4.1	89±4	1.08, A
			Zn-65	192.0±11.4 179.0±14.9 192.0±11.2 Mean = 187.7±7.3	187±9	1.01, A
			Co-60	143.0±4.8 145.0±6.0 147.0±4.7 Mean = 145.0±3.0	149±7	0.97, A
			Co-58	98.1±5.2 99.4±7.0 104.0±5.4 Mean = 100.5±3.4	97±5	1.04, A

(1) Results reported as activity ± 1 sigma.
(2) Results reported as activity ± 3 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.
(D) Evaluation Results, Disagreement.
(NC) Nonconformity Report Number

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Soil (pCi/gram)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (2)	RATIO (3)
06/13/02	E-3216-05	SOIL pCi/gram	Ce-141	0.114±0.026 0.186±0.024 0.141±0.022 Mean = 0.147±0.014	0.122±0.006	1.20, A
			Cr-51	0.427±0.142 0.349±0.125 0.334±0.122 Mean = 0.370±0.075	0.318±0.016	1.16, A
			Cs-134	0.158±0.020 0.126±0.020 0.192±0.020 Mean = 0.159±0.012	0.163±0.008	0.98, A
			Cs-137	0.240±0.019 0.214±0.022 0.204±0.020 Mean = 0.219±0.012	0.208±0.010	1.05, A
			Mn-54	0.133±0.015 0.157±0.017 0.132±0.018 Mean = 0.141±0.010	0.129±0.006	1.09, A
			Fe-59	0.107±0.027 0.099±0.029 0.145±0.030 Mean = 0.117±0.016	0.109±0.005	1.07, A
			Zn-65	0.227±0.027 0.292±0.034 0.279±0.034 Mean = 0.266±0.019	0.243±0.012	1.09, A
			Co-60	0.156±0.012 0.165±0.014 0.142±0.013 Mean = 0.154±0.008	0.168±0.008	0.92, A
			Co-58	0.115±0.016 0.114±0.017 0.125±0.017 Mean = 0.118±0.010	0.135±0.007	0.87, A

(1) Results reported as activity ± 1 sigma.
(2) Results reported as activity ± 3 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Vegetation (pCi/gram)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (2)	RATIO (3)
06/13/02	E-3218-05	VEGETATION pCi/gram	Ce-141	0.175±0.006 0.161±0.007 0.176±0.008 Mean = 0.171±0.004	0.154±0.008	1.11, A
			Cr-51	0.414±0.038 0.424±0.040 0.385±0.042 Mean = 0.408±0.023	0.403±0.020	1.01, A
			Cs-134	0.227±0.007 0.218±0.007 0.229±0.008 Mean = 0.225±0.004	0.206±0.010	1.09, A
			Cs-137	0.162±0.006 0.154±0.007 0.178±0.007 Mean = 0.165±0.004	0.156±0.008	1.06, A
			Mn-54	0.186±0.007 0.184±0.007 0.193±0.001 Mean = 0.188±0.004	0.163±0.009	1.15, A
			Fe-59	0.154±0.009 0.141±0.009 0.156±0.010 Mean = 0.150±0.006	0.138±0.007	1.09, A
			Zn-65	0.327±0.016 0.343±0.016 0.324±0.017 Mean = 0.331±0.009	0.308±0.015	1.07, A
			Co-60	0.233±0.006 0.229±0.006 0.230±0.006 Mean = 0.231±0.004	0.213±0.011	1.08, A
			Co-58	0.187±0.007 0.183±0.007 0.184±0.008 Mean = 0.185±0.004	0.171±0.009	1.08, A

(1) Results reported as activity ± 1 sigma.
(2) Results reported as activity ± 3 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Water (Bq/liter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/01/02	QAP-56	WATER Bq/liter	Cs-134	2.5±1.0 2.4±0.8 3.0±0.6 2.7±1.1 2.3±1.4 Mean = 2.6±0.5	3.4±0.2	0.77, D NC-02-02
			Cs-137	57.1±1.8 52.9±1.7 57.0±1.7 53.7±1.7 55.5±1.9 Mean = 55.7±0.8	56.1±2.9	0.99, A
			Co-60	352.0±3.0 355.9±3.1 353.0±3.0 352.6±3.8 354.5±3.6 Mean = 353.8±1.5	347.3±12.4	1.02, A

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML(See Section 8.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.
(D) Evaluation Results, Disagreement
(NC) Nonconformity Report Number

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Water (Bq/liter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
09/01/02	QAP-57	WATER Bq/liter	Cs-134	62.9±2.2 61.1±2.3 59.9±2.2 57.7±2.7 60.7±1.7 62.2±2.1 Mean = 60.7±0.9	60.2±1.9	1.01, A
			Cs-137	81.0±2.5 77.7±2.5 78.1±2.4 73.3±2.9 77.8±1.8 78.8±2.5 Mean = 77.7±1.0	81.4±4.3	0.95, A
			Co-60	265.7±3.4 271.6±3.6 275.7±3.5 258.6±4.2 268.3±2.5 270.5±3.4 Mean = 268.4±1.4	268.7±9.7	1.00, A

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML(See Section 8.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Air Particulate Filters (Bq/filter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/01/02	QAP-56	FILTER Bq/filter	Co-60	28.4±0.4 29.5±0.4 30.0±0.4 29.6±0.5 29.2±0.4 Mean = 29.3±0.2	30.5±0.7	0.96, A
			Mn-54	40.3±0.6 39.6±0.6 40.0±0.6 40.7±0.7 40.0±0.6 Mean = 40.0±0.3	38.5±0.9	1.04, A
			Cs-137	28.2±0.5 28.0±0.5 27.5±0.5 27.8±0.5 27.8±0.4 Mean = 27.9±0.2	28.2±0.7	0.99, A
09/01/02	QAP-57	FILTER Bq/filter	Mn-54	58.1±1.0 57.7±1.1 58.5±1.0 58.1±1.3 58.5±0.9 57.0±1.0 Mean = 58.0±0.4	52.2±1.2	1.11, A
			Co-60	24.0±0.5 23.5±0.6 22.6±0.5 23.0±0.7 22.4±0.5 22.9±0.5 Mean = 23.1±0.2	23.0±0.1	1.00, A
			Cs-137	33.6±0.7 34.3±0.8 33.8±0.7 34.6±0.9 32.9±0.7 34.2±0.7 Mean = 33.9±0.3	32.5±0.8	1.04, A

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML(See Section 8.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gross Beta Analysis of Water (Bq/liter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/01/02	QAP-56	WATER Bq/liter	GROSS BETA	1099±17 1125±17 1110±17 Mean = 1111±10	1030±130	1.08, A
09/01/02	QAP-57	WATER Bq/liter	GROSS BETA	782±20 787±20 823±20 Mean = 797±11	900±90	0.89, A

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML (See Section 8.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Tritium Analysis of Water (Bq/liter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1&3)	REFERENCE LABORATORY* (1)	RATIO (2)
03/01/02	QAP-56	WATER Bq/liter	H-3	325±5 310±6 313±7 Mean = 316±3	283.7±3.4	1.11, A
09/01/02	QAP-57	WATER Bq/liter	H-3	249±10 241±10 239±10 Mean = 243±6	227.3±5.6	1.07, A

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML (See Section 8.3).
(3) Analysis performed by vendor laboratory: Framatome, ANP
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gross Beta Analysis of Air (Bq/filter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/01/02	QAP-56	AIR Bq/filter	GROSS BETA	1.21±0.003 1.18±0.03 1.21±0.03 Mean = 1.20±0.02	1.30±0.13	0.92, A
09/01/02	QAP-57	AIR Bq/filter	GROSS BETA	0.84±0.03 0.80±0.03 0.85±0.03 Mean = 0.83±0.02	0.87±0.09	0.95, A

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML (See Section 8.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.

8.5 REFERENCES

8.5.1 Semi-Annual Report of the Department of Energy, Office of Environmental Management, Quality Assessment Program, EML 617, June 2002.

8.5.2 Semi-Annual Report of the Department of Energy, Office of Environmental Management, Quality Assessment Program, EML 618, December 2002.

8.5.3 Radioactivity and Radiochemistry, The Counting Room: Special Edition, 1994 Caretaker Publications, Atlanta, Georgia.

8.5.4 Data Reduction and Error Analysis for the Physical Sciences, Bevington P.R., McGraw Hill, New York (1969).

9.0 GRAPHICAL PRESENTATIONS

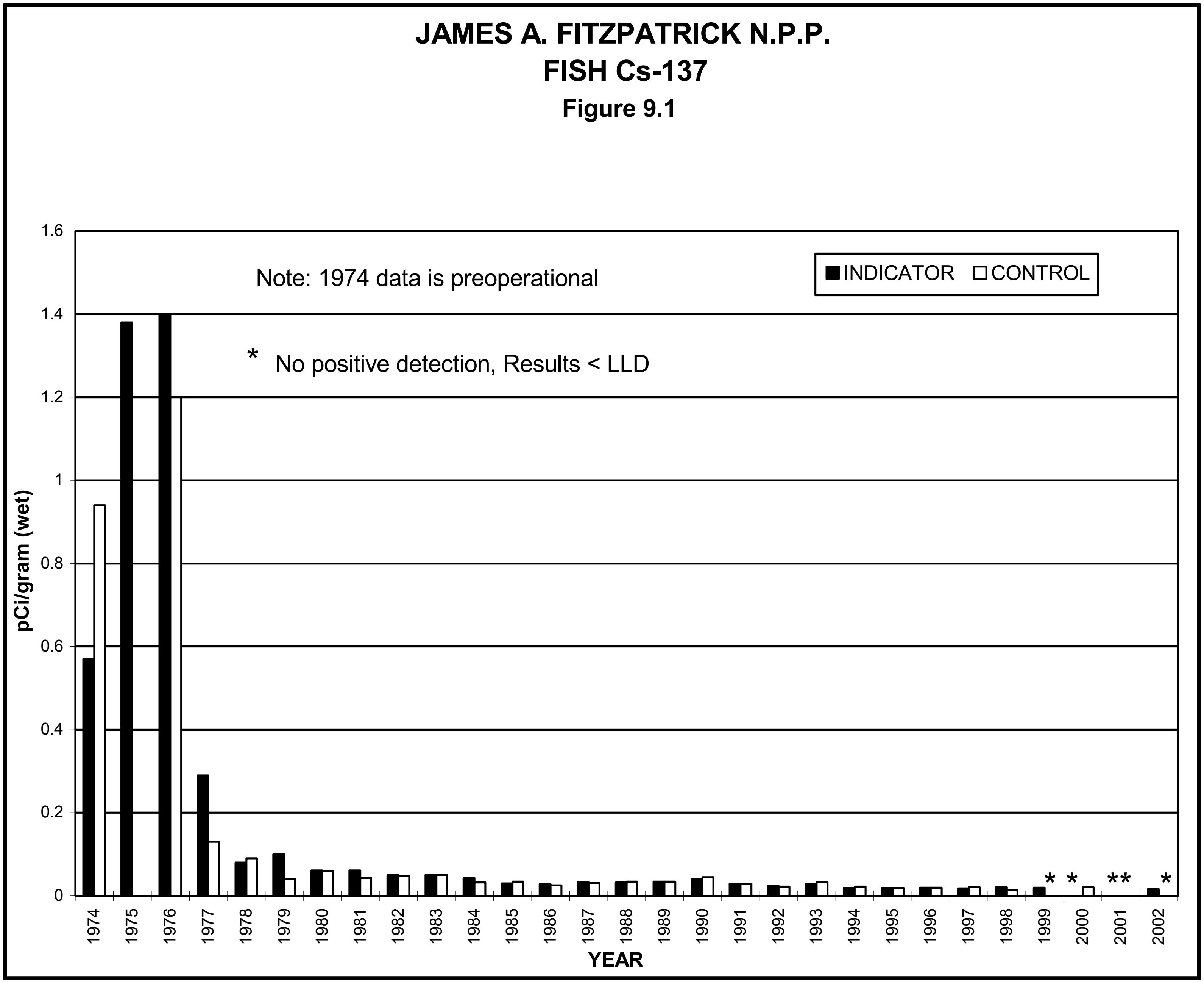
1. DATA GRAPHS

This section includes graphic representation of selected sample results.

For graphic representation, results reported as MDL or LLD were considered to be at the "zero" level of activity. MDL and LLD results were indicated where possible.

2. SAMPLE LOCATIONS

Sample location results specified as "indicator" and "control" on the graphs can be referenced back to Section 3.3 for specific locations.


JAMES A. FITZPATRICK N.P.P.
FISH Cs-137
Figure 9.1
Note: 1974 data is preoperational
* No positive detection, Results < LLD
INDICATOR
CONTROL
pCi/gram (wet)
YEAR
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
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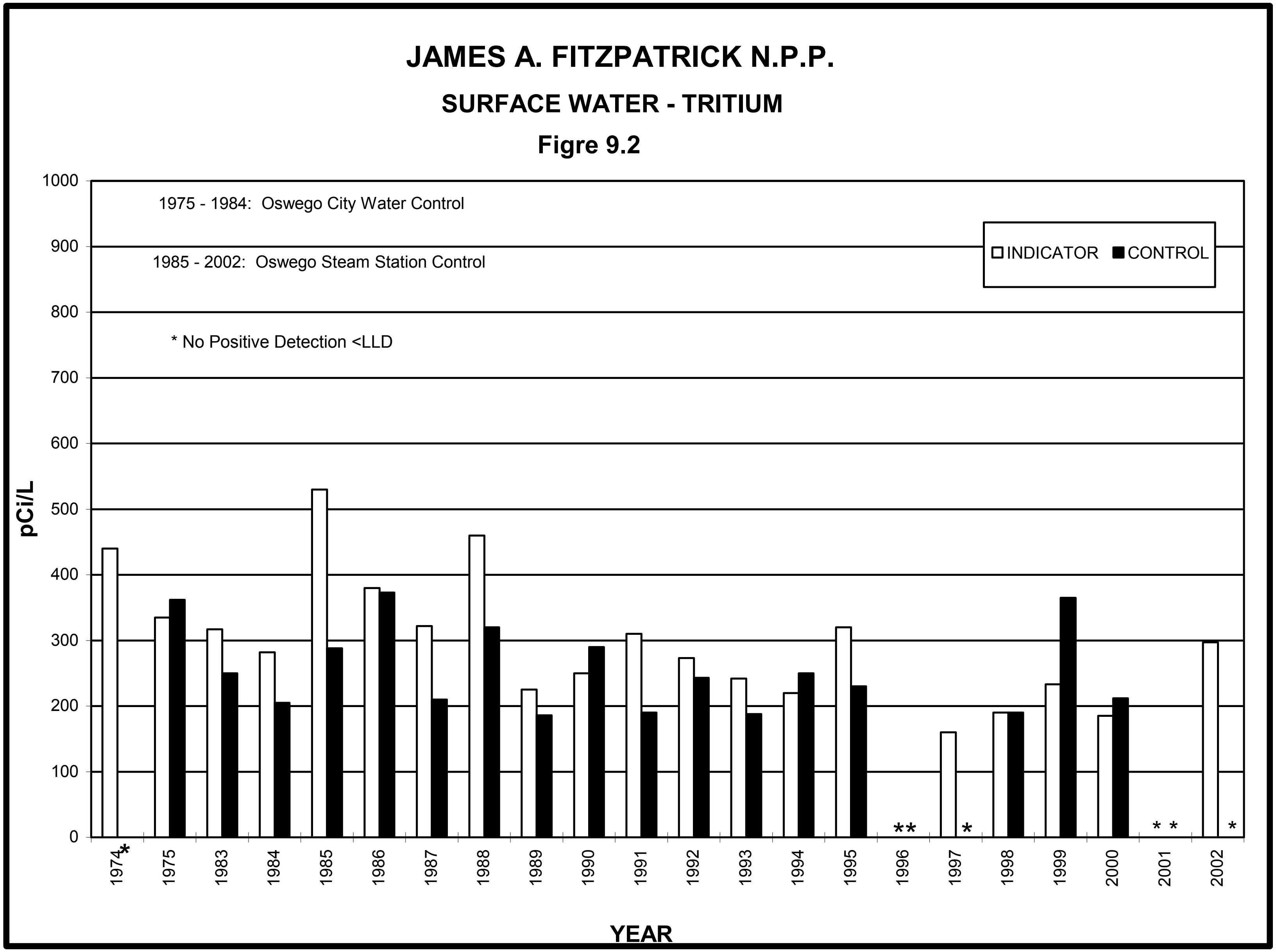
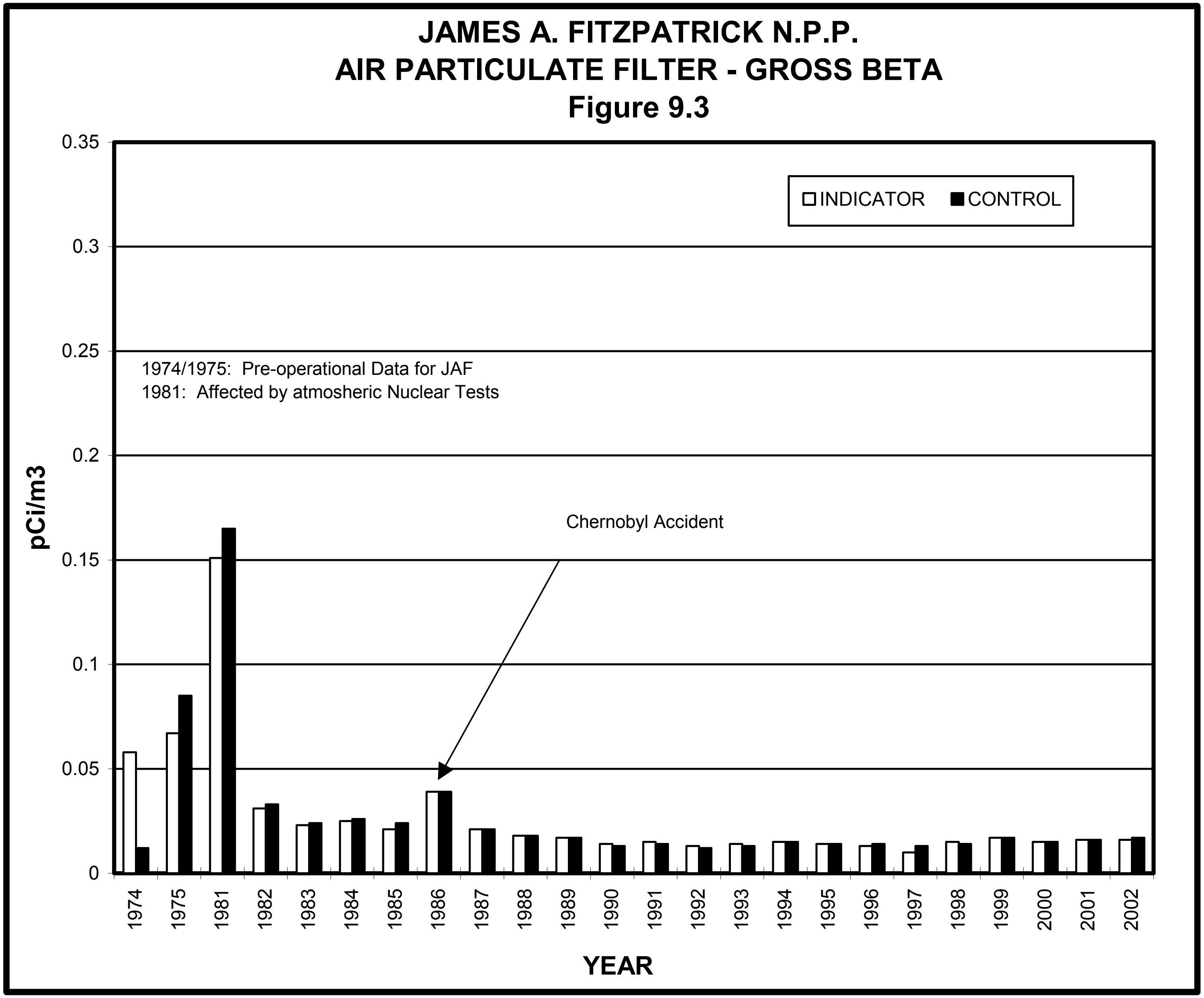
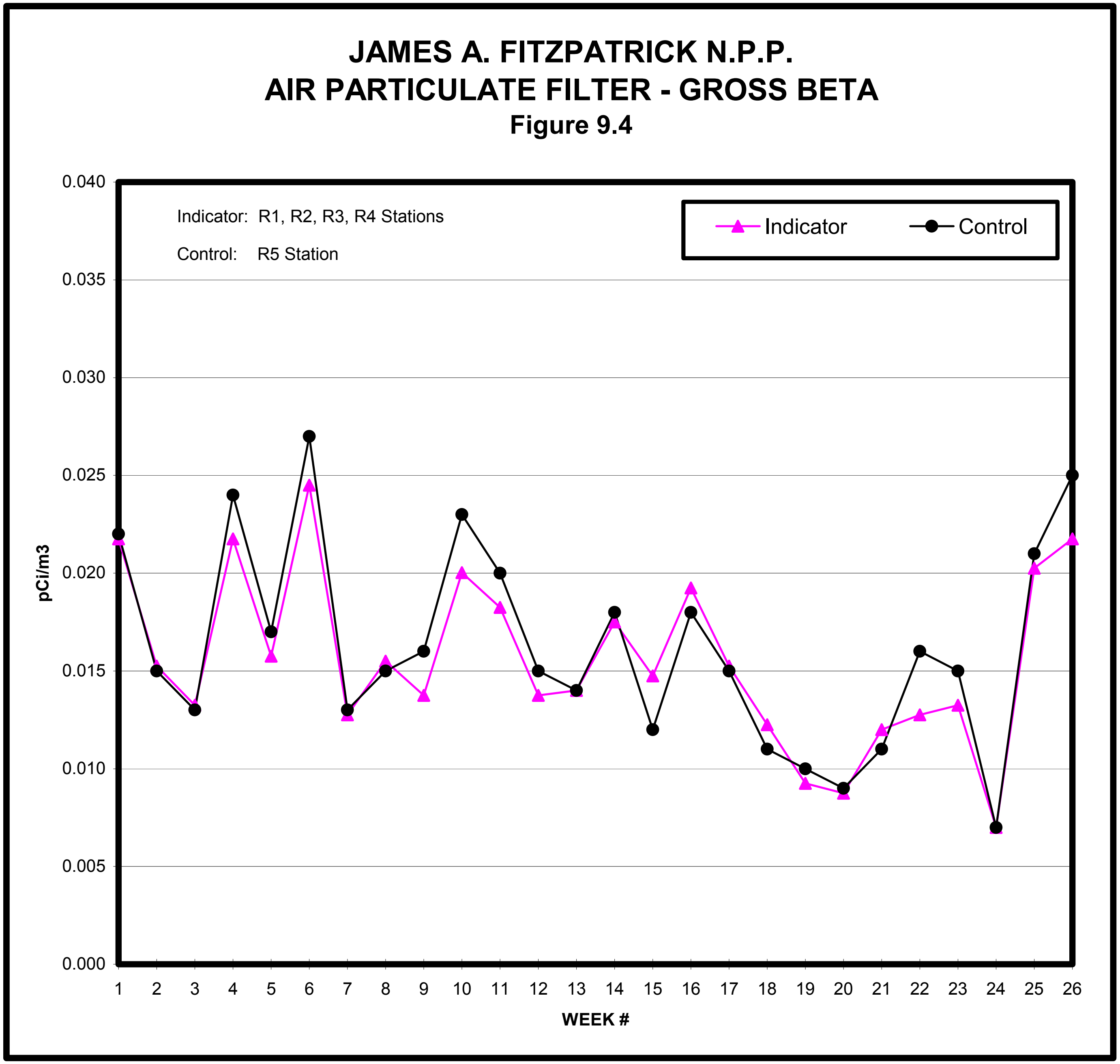
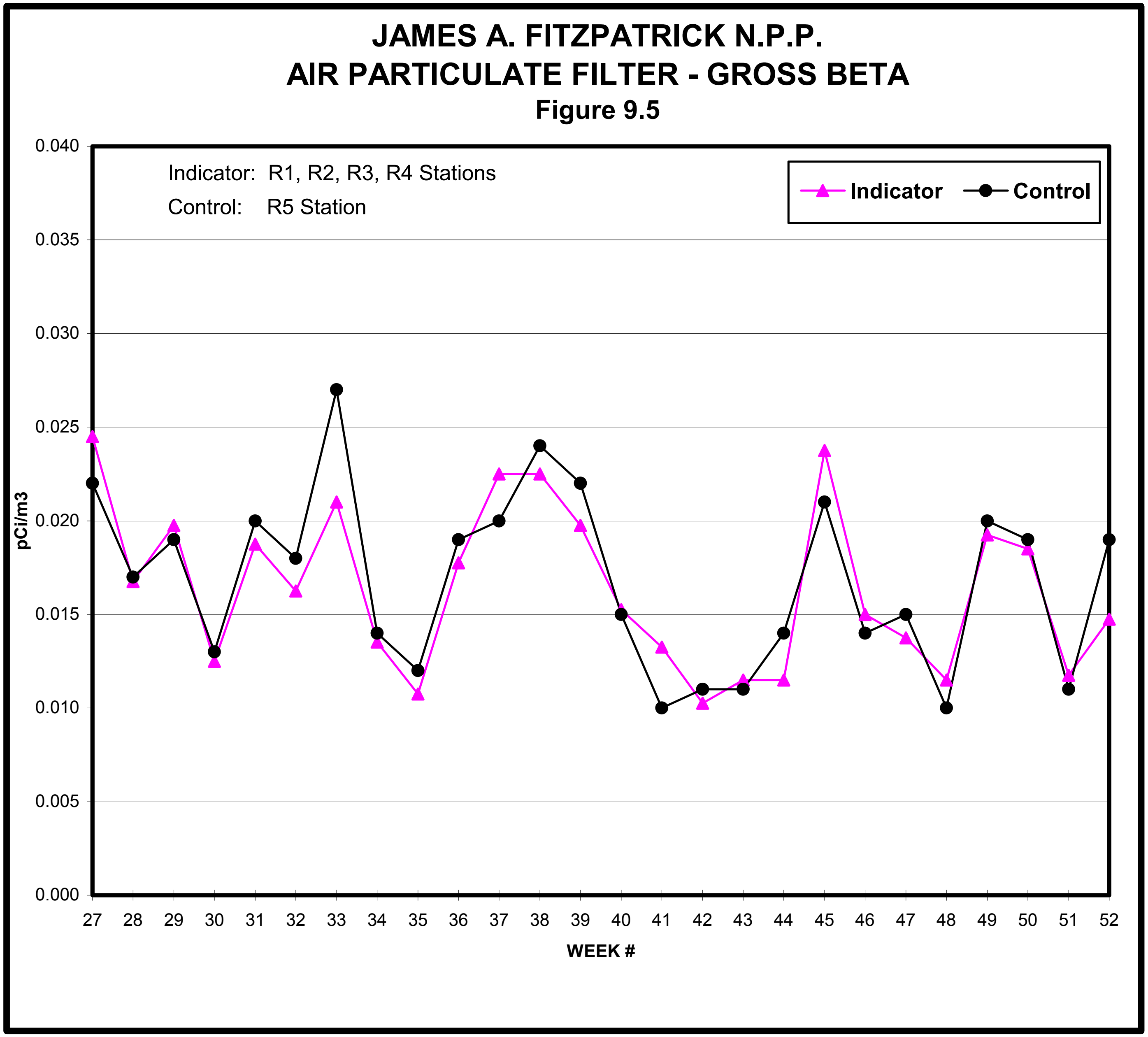
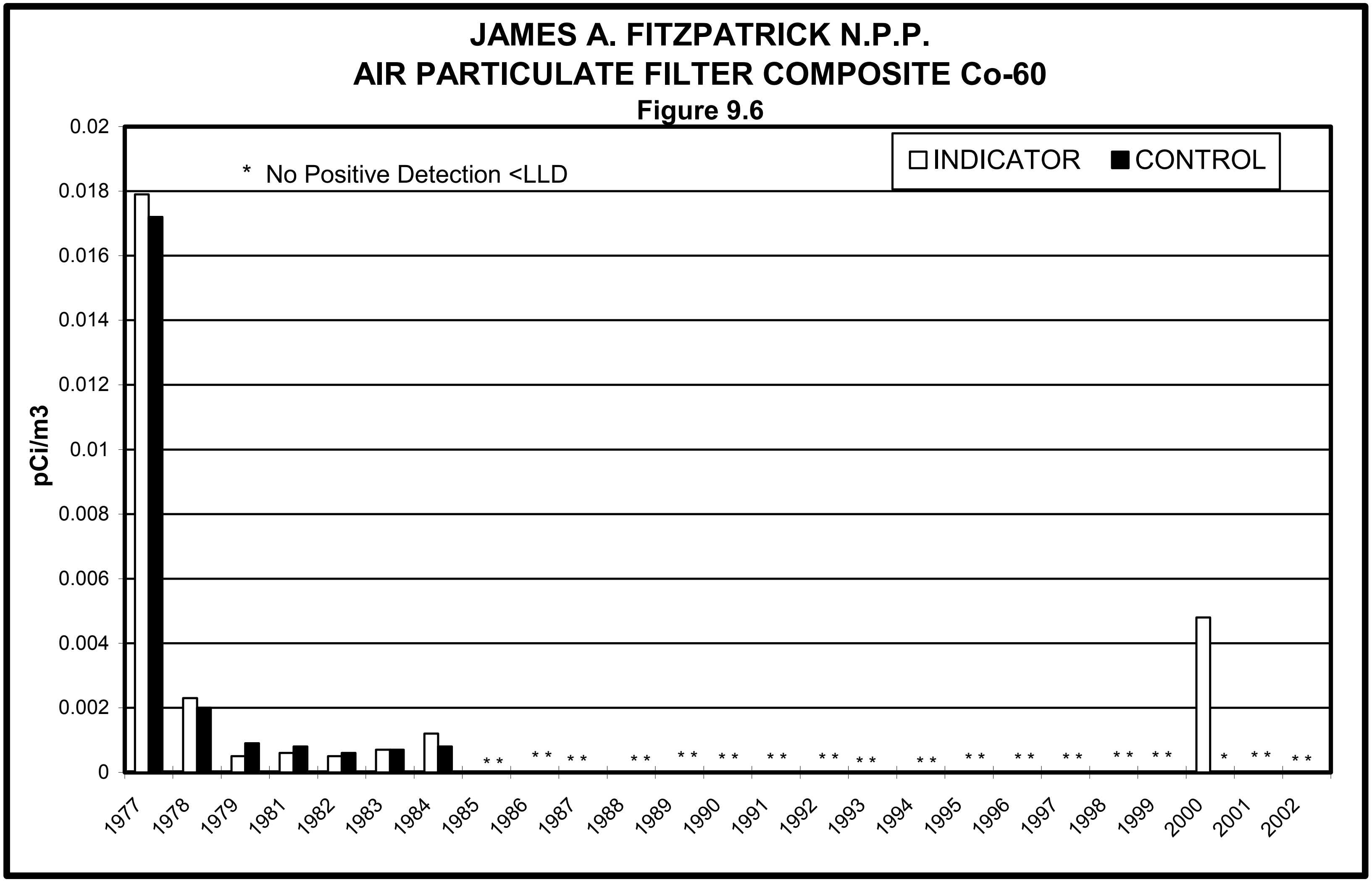
1997
1998
1999
2000
2001
2002

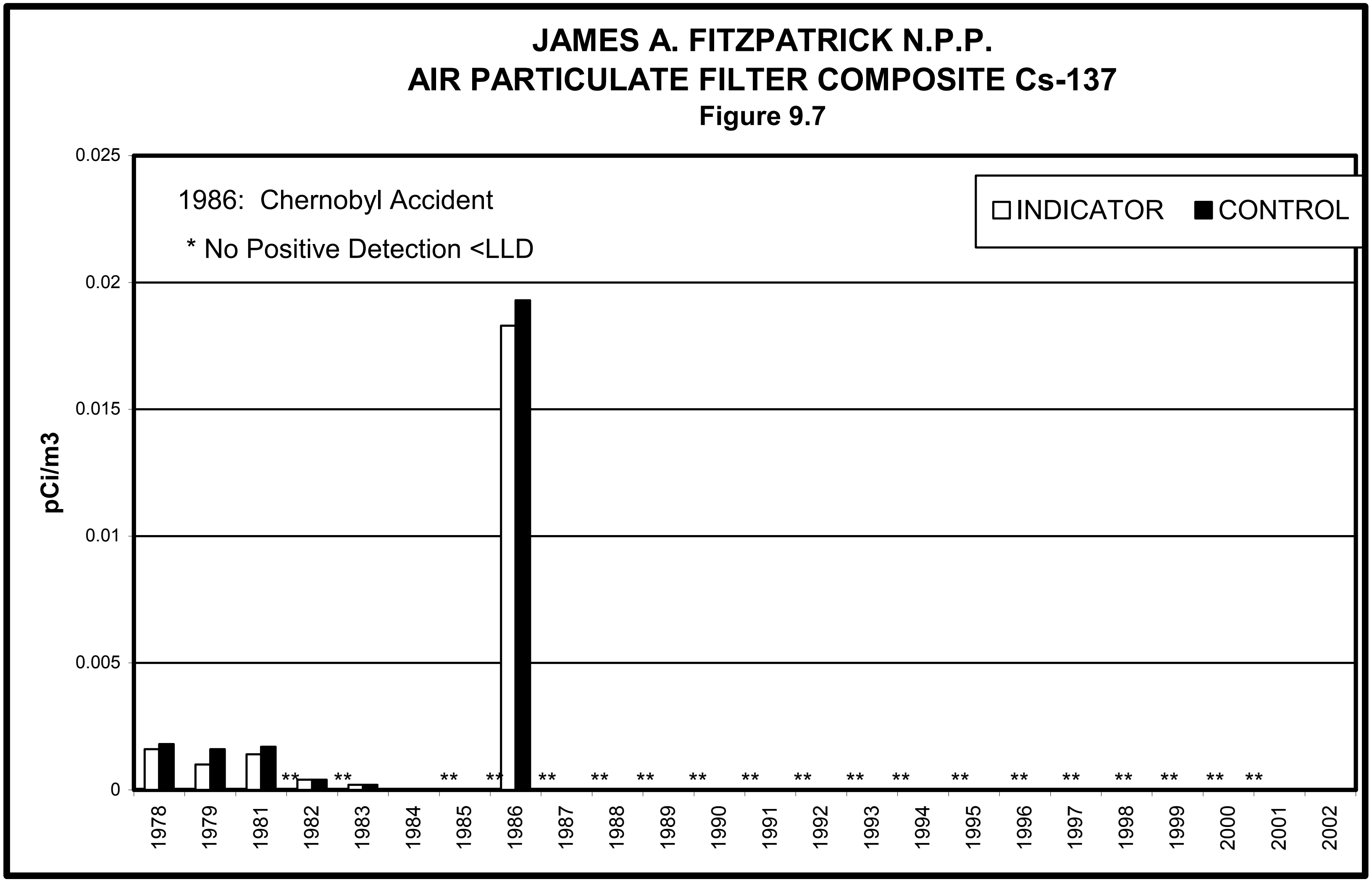

JAMES A. FITZPATRICK N.P.P.
SURFACE WATER - TRITIUM
Figre 9.2
1975 - 1984: Oswego City Water Control
1985 - 2002: Oswego Steam Station Control
* No Positive Detection <LLD
INDICATOR
CONTROL
pCi/L
1000
900
800
700
600
500
400
300
200
100
0
1974
1975
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
YEAR

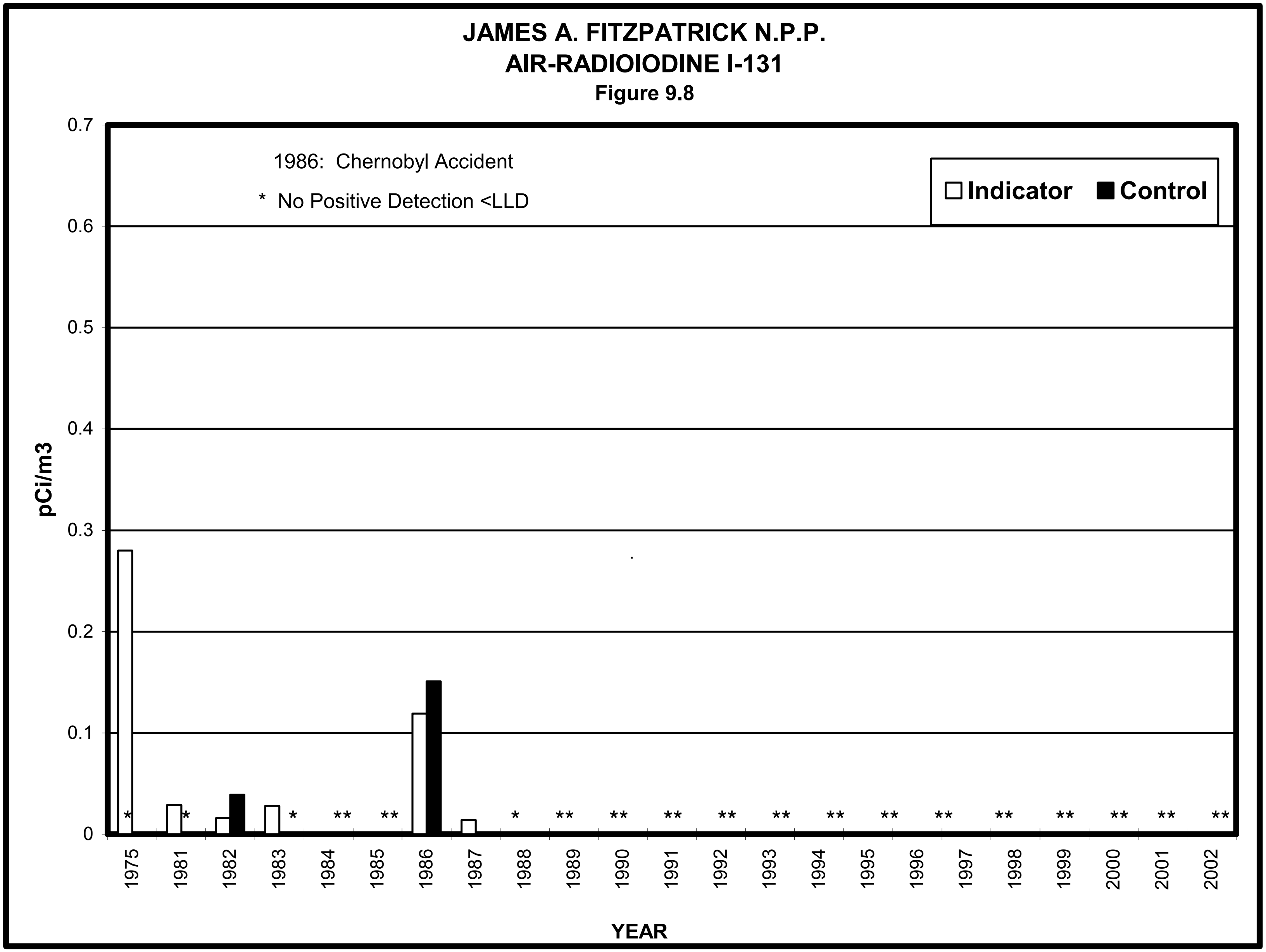

JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE FILTER - GROSS BETA
Figure 9.3
INDICATOR
CONTROL
1974/1975: Pre-operational Data for JAF
1981: Affected by atmosheric Nuclear Tests
Chernobyl Accident
pCi/m3
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1974
1975
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
YEAR

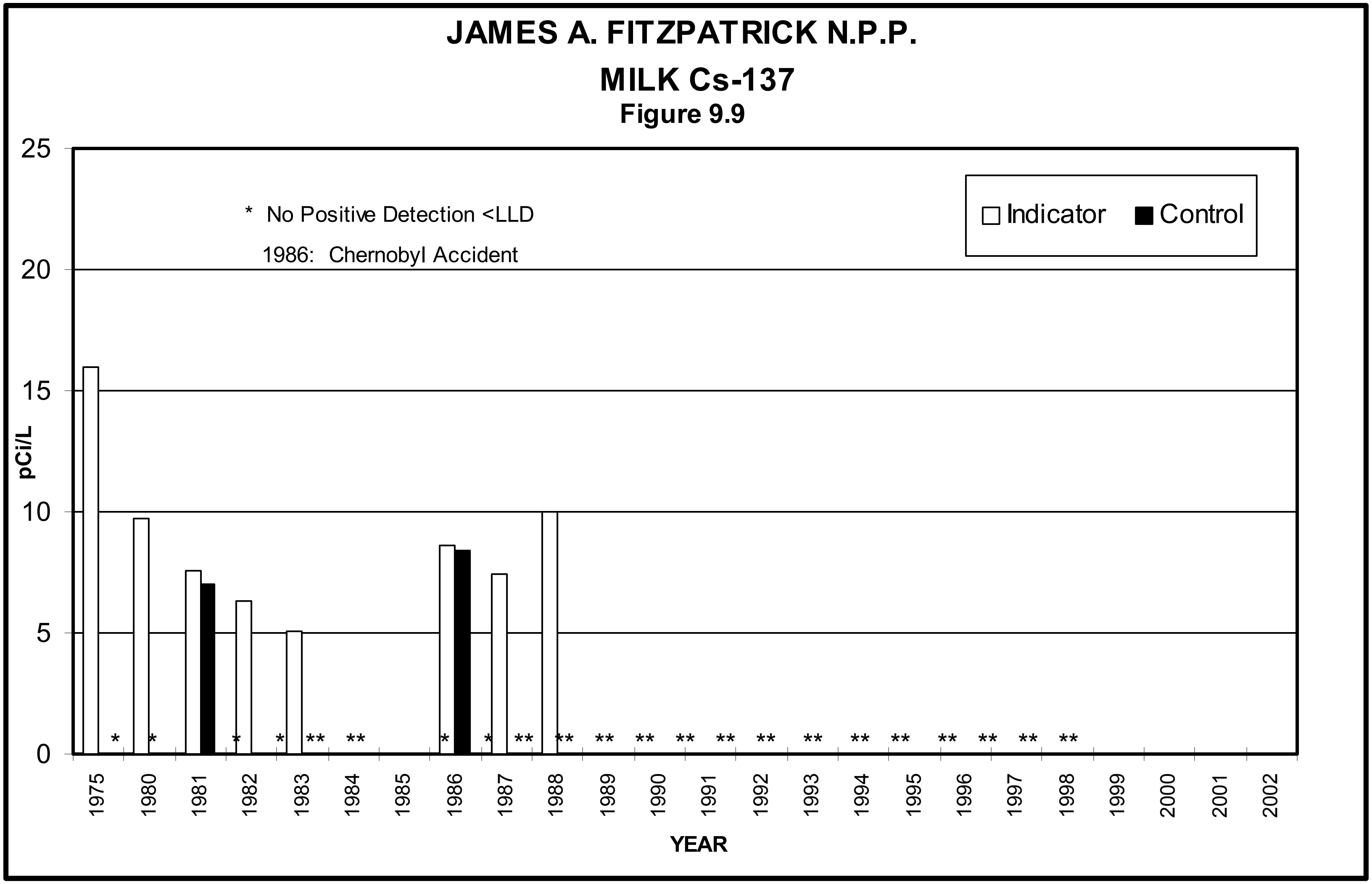

JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE FILTER - GROSS BETA
Figure 9.4
Indicator: R1, R2, R3, R4 Stations
Control: R5 Station
Indicator
Control
pCi/m3
WEEK #
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

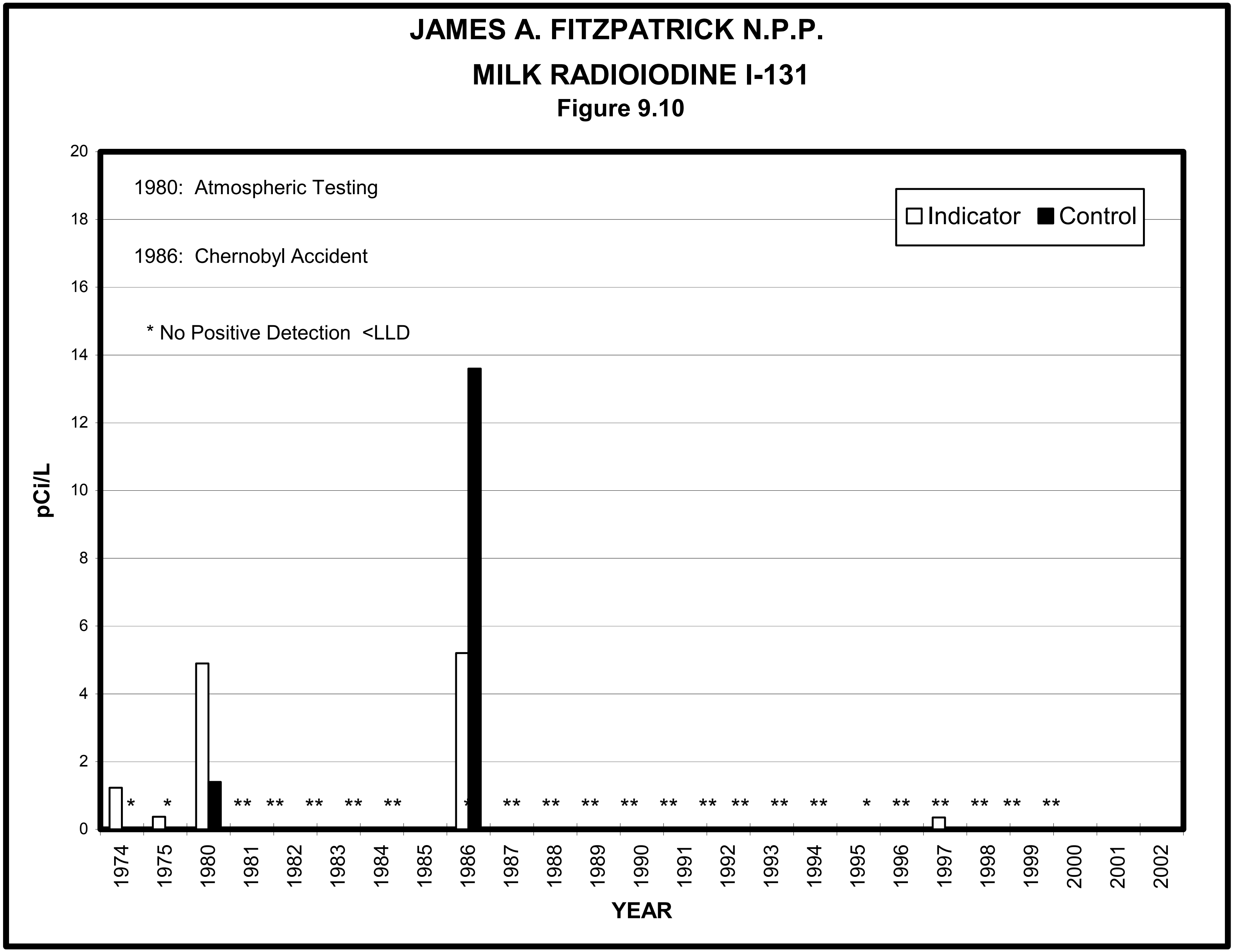

JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE FILTER - GROSS BETA
Figure 9.5
Indicator: R1, R2, R3, R4 Stations
Control: R5 Station
Indicator
Control
pCi/m3
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
WEEK #


JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE FILTER COMPOSITE Co-60
Figure 9.6
* No Positive Detection <LLD
INDICATOR
CONTROL
pCi/m3
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1977
1978
1979
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002


JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE FILTER COMPOSITE Cs-137
Figure 9.7
1986: Chernobyl Accident
* No Positive Detection <LLD
INDICATOR
CONTROL
pCi/m3
0.025
0.02
0.015
0.01
0.005
0
1978
1979
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002


JAMES A. FITZPATRICK N.P.P.
AIR-RADIOIODINE I-131
Figure 9.8
1986: Chernobyl Accident
* No Positive Detection <LLD
Indicator
Control
pCi/m3
YEAR
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1975
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002


JAMES A. FITZPATRICK N.P.P.
MILK Cs-137
Figure 9.9
* No Positive Detection <LLD
1986: Chernobyl Accident
Indicator
Control
pCi/L
0
5
10
15
20
25
1975
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
YEAR


JAMES A. FITZPATRICK N.P.P.
MILK RADIOIODINE I-131
Figure 9.10
1980: Atmospheric Testing
1986: Chernobyl Accident
* No Positive Detection <LLD
Indicator
Control
pCi/L
20
18
16
14
12
10
8
6
4
2
0
1974
1975
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
YEAR

JAMES A. FITZPATRICK N.P.P.
TLD DATA
Figure 9.11